A THESIS ON
SCHOOL OF DENTISTRY
NEW AHMADU BELLO UNIVERSITY TEACHING HOSPITAL
SHIKA ZARIA •

PRESENTED TO

DEPERTENT OF ARCHITECTURE
FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY
ZARIA.

BY:-

RIFUKATU ADEBUKUNOLA ABEKE ELELU

IN PARTIAL FULFIIMENT FOR THE AWARD OF

A MASTER OF SCIENCE DEGREE IN

ARCHITECTURE

IN

JUNE, 1986.

EXAMINER

HEAD OF DEPARTMENT
ARCHITECTURE.

DECLARATION

I hereby declare that this Thesis has no bearing with any work done by any individual or group of individuals which has been presented and accepted for a Higher Degree. It has been composed by me and is a record of my own research work. All quotations are distinguished by quotation marks and all sources of information has been acknowledged by means of references.

RIFUKATU ADEBUKUNOLA ABEKE ELELU

DEDICATION

This Thesis is dedicated
To God, the Architect of all things,
To my parents for setting me on the road to the goal,
To my husband Mr. Fatai Ademola Adeshina,
Whose encouragements and support have curved the part for me,
Whose dedication had made the mark on me and for making that goal attainable,
To my Mother
Alhaja Siba Ramatu Elelu
Mother of mothers
Woman among women
The strength to my frail frame
Fuel to my flickering flame, and
To all others who aided me in my rough road to the goal.

MOTIVATION

Oh, the pain
The pain that ached my jaw
The pain that made me groan
The most severe pain, yet it does not kill
The aftermath of a tooth decay.
Since that day in May, 1984 the thought of what
to do to help the course of dental science has
been on my mind, I could not enroll as a dental
student far I was already engrossed in Architecture
Then the light shone
Dimly at first
Then the vision formed
The vision of a Dental School.

ACKNOWLEDGEMENTS

In a thesis of this nature where case studies and data collections are essential in order to fulfill the design goals and objectives, ohe builds enormous depts. It is however, impossible to acknowledge them all. The omission of any name(s) therefore is not a spite to those people but a matter of expediency.

First I would thank my Supervisor Professor E.A. Adeyemi, Head of Department of Architecture, Ahmadu Beloo University Zaria, for his always attentive ears and priceless suggestions, I am also grateful to Dr. F.J. Schwerdfegar, Arch. Onaba and all my ledturers in the department, who have borne me frailties and guided me through the department.

My mother Alhaja Ramatu Siba Elelu and my Husband Mr. Fatai Ademola Adeshina deserves special mention. It was them who endured deprivations to give me the confort necessary for this highly tasking endeavour. I also remember all the members of Alabi family, my brothers and sisters who stood by me all through.

My gratitude also goes to Mr. J. Akin Somoye, Manager, Medical system Division Philips(Nigeria) Limited, Dr. Lambo, Head of Dental Centre Kaduna, Mr. Dapo Ogunmowo, Engineering department Lagos University Teaching Hospital, All staff of planning office estate department Ahmadu Bello University Zaria, Dental division Lagos University Teaching Hospital, Dental School University of Ife, Dental School, University College Hospital

Ibadan, Capital project Division University College Hospital Ibadan.

I can not enumerate all my friends and classmates who doserve special thanks but I am grateful to them all.

I will not forget Mazi Samuel Onyenmaeze Osuagwu of Works and Services Department, The Federal Polytechnic, Kaura Namoda, the dutiful typist whose effort and understanding made the typing of this thesis possible.

To all those and many more whose names have not been specifically mentioned but who have also contributed immensely to the success of this work, I say thank you.

ABSTRACT

Change in diet and especially the production of European type of sweets, soft drinks and chocolates has had an increasing adverse effect on dental health particularly among younger people. Hence it comes as no surprise that there is a rapidly growing demand for Dentists and Dental Clinics all over the country.

Nigeria with a population of about 100 million, has only four Dental schools non of which is of a standard design, or has all the requirements of a standard dental school. All the schools are located in the Southern part of the country. Dental clinics attached to hospitals in the Northern Nigeria are all service rather than teaching oriented departments and the establishment of a Dental School in the Northern part of the country is long overdue, in order to redress the imbalance between North and South also to meet the rising service demand throughout the country.

The initial size of the proposed school is based on an annual intake of between twenty and thirty students, whose course of study will last five years. The scope of the design include an Administrative block,Inception area, record stores and dispensary for patients, Diagnostic clinic four departments together with clinics and wards for the treatment of patients and demonstration, students training unit and Anci1]ary facilities.

The thesis aims at, planning the whole school to provide possibilities for future expansion of most department and clinics. It also aims at having the ground floor designated mainly for patients, while the upper floor is reserved exclusively for staff and students.

The design will be flexible to enable the University construct the new school in various phases according to priorities. A court-yard, type of building- is aimed at in solving many problems which are posed by technical and climatic difficulties, such as in- sufficient sunlight and ventilation as they are very important in the dental clinics and the court-yard will also be used to reduce long corridors.

From the research and analysis carried out, I hope a standard school of Dentistry will be achieved.

TABLE OF CONTENTS

TITLE		PAGE
Title page	:	
Declaration	:	i.
Dedication	:	ii.
Motivation	:	iii.
Acknowledgement	:	iv. - v.
Abstract	:	vi. -vii.
Table of Content	:	
List of Figures	:	
List of Plates	:	
CHAPTER 1 INTRODUCTION		
1.10 The History of Dentistry	:	1
1.20 Dental Schools in Nigeria	:	2
1.30 Dental Health Care	:	3
1.31 Dental Diseases	:	4
1.32 Diagnosis and Treatment	:	5
1.33 Repairing and Treatment	:	6
1.34 Prevention	:	8
CHAPTER 2 DENTAL SCHOOL DEPARTMENTS		
2.10 Administrative Department	:	10
2.11 Central Administrative Units	:	10
2.12 Academic Unit	:	11
2.20 Reception of patients, Record Stores and Pharmacy	:	11
2.30 Diagnostic Clinic	:	13
2.31 Emergency Room	:	14
2.32 Radiology Unit	:	14
2.40 Department of Oral Surgery and Oral Medicine	:	15

2.41	Extraction clinic (Local Aneasthesia)	:	22
2.42	Extraction Clinic (General Aneasthesia	:	22
2.43	Operating Tract in a Dental Hospital	:	23
2.44	Wards	:	34
2.45	Sterilization Units	:	39
2.50	Department of Preventive Medicine Social Dentistry and Periodontology	:	40
2.51	Periodontic Clinic	:	42
2.52	Orthodontic Clinic	:	42
2.60	Department of Conservation Prosthetics and Pedodontics	:	43
2.61	Conservative Clinic	:	43
2.62	Prosthetic Clinic	:	43
2.63	Pedodontic Clinic	:	46
2.70	Department of Pathology and Biology	:	48
2.71	Pathology	:	48
2.72	Biology	:	50
2.80	Students Training Unit	:	50
2.81	Lecture Rooms	:	51
2.82	Seminar Rooms	:	52
2.83	Audio-Visual Laboratory	:	53
2.84	Preclinical Laboratory(Phantom room)	:	54
2.85	Library	:	58
2.86	Student Lounges	:	60
2.87	Locker Rooms	:	60
2.88	Functional Relationship of the Departments	:	62
CHAPTER 3 CLINICS			
3.10	Patients movements in the clinics	:	64
3.20	Space Allocation of Dental Treatment Booths	:	66

3.30	Services installations in a dental clinic	:	77
3.31	Compressed Air Supply	:	78
3.32	Emergency electrical supply	:	79
3.33	Water quality for dental units	:	80
3.34	Ventilation	:	80
3.35	Lighting	:	81

CHAPTER 4 CASE STUDIES

4.10	School of Dentistry University of Ife	:	84
4.20	School of Dentistry U.C.H. Ibadan	:	89
4.30	School of Dentistry L.U.T.H. Lagos	:	98
4.40	New clinic and Policlinic for Dental, Oral and Maxillary patients Justus-Liebig University, GieBen	:	102
4.50	Groningen University Dental School	:	107

CHAPTER 5 THE SITE

5.10	Site Selection Criteria	:	113
5.20	Location	:	114
5.30	Climatic Conditions	:	116
5.40	Climatic Design - Performance and Specifications	:	118
5.50	Site Analysis	:	119

CHAPTER 6 THE DESIGN

6.10	Aims and Objectives	:	123
6.20	Scope of Thesis	:	123
6.30	Design Concept	:	124
6.40	Schedule of Accommodation	:	127
6.50	Design Report	:	136

LIST OF FIGURES

FIGURES		PAGE
1.1	X-ray showing Milk and parmanent dentition	7
2.1	Dental Radiology Equipment (central Unit)	16
2.2	Dental Radiology Equipment (central Unit)	17
2.3	Dental Radiology Equipment (Departmental Unit)	18
2.4	Example of a large X-ray room	19
2.5	Example of a Darkroom	20
2.6	Example of types of diseases treated in extraction clinic	21
2.7	Functional flow diagram of an Aseptic Dental surgical department	25
2.8	Operating theatre flow diagram	26
2.9	Example of an operating Dental Theatre	27
2.10	Example of Exit/Disposal with Immediate Sterilization (Surgical Department)	28
2.11	Aneasthesia room and equipment	29
2.12	Example of Aneasthetic room and equipment	30
2.13	Example of scrub-up room and equipment	31
2.14a	The scialytique principle of lighting the site of operation	35
2.14b	The super-scialytique principle section through theatre	35
2.14c	Section through Jean Walter's operating theatre lile	35
2.15a	Section through a theatre at the Boucicault hospital, Paris	36
2.15b	Lighting system designed for St.Lo Hospital	36
2.15c	Diagram of Andre Walter's voute Elliptique	36
2.15d	Operating theatre light-fitting using several low voltage tungsten bulb	36
2.15e	Operating theatre light fitting using flourescent tubes	36

2.16	Ward area's typical relationship	:	37
2.17a	Central Sterilizing Unit equipment	:	41
2.17b	Departmental sterilizing equipment	:	41
2.18	Types of cases treated in on orthodontic clinic	:	44
2.19a	Replacement of missing teeth	:	45
2.19b	Missing teeth caused drifting, rotation and tipping of adjacent teeth	:	45
2.20	Prosthetics laboratory equipment	:	47
2.21	Some types of cases treated in pedodontic clinic	:	49
2.22	Phantom table	:	55
2.23	Phantom Unit	:	57
2.24	Some Laboratory equipment	:	59
3.1	Patients and information flow plan	:	65
3.2	Space requirement for cubicle arrangement	:	67
3.3	Treatment booth equipment	:	68
3.4a	Dental unit equipment	:	69
3.4b	Dental assistant's stool and Operator's stool	:	69
3.5	The most important measurements in a dental treatment booth	:	70
3.6	Dental treatment chair dimensions	:	71
3.7	Surgical department treatment booth	:	72
3.8	Orthodontics department treatment booth	:	73
3.9	Lecture room	:	74
3.10	Demonstration room	:	75
3,11	Conservative & Prosthetic Department Treatment Booth	:	76
3.12	Dental light	:	83
5.1	Site location of New A.B.U. Teaching Hospital Shika site	:	114

5.2 Climatic data : 117
5.3 Site location : 120
5.4 Site Location : 120
5.5 Site location : 121

LIST OF PLATES

	PLATES		PAGE
1.	Main entrance dental school Uni-Ife	:	85
2.	Main connecting corridor dental school University of Ife	:	85
3.	Treatment room dental school Uni-Ife	:	88
4.	Treatment room dental school Uni-Ife	:	88
5.	Main entrance dental school U.C. H. Ibadan	:	91
6.	Operating theatre dental school U.C.H Ibadan	:	91
7.	Staff laboratory and equipment dental school U.C.H. Ibadan	:	92
8.	Preclinical Laboratory dental school U. C. H. Ibadan	:	92
9.	Flasking room dental school UCH Ibadan	:	93
10.	Polishing room dental school U.C.H Ibadan	:	93
11.	Metal casting room dental school U.C. H. Ibadan	:	94
12.	Main casting room dental school U.C.H Ibadan	:	94
13.	Central Sterilizing unit dental school U.C.H. Ibadan	:	95
14.	Department sterilizing unit dental school U.C.H. Ibadan	:	96
15.	Main waiting area dental school U.C.H Ibadan	:	97
16.	Treatment booth dental school U.C.H. Ibadan	:	97
17.	Front elevation dental school LUTH Lagos	:	99
18.	Treatment booth conservative department dental school LUTH Lagos	:	99
19.	Preclinical laboratory (Phantom head) Dental school LUTH Lagos	:	101

20.	Crome cobalt molding room dental school LUTH Lagos	:	101
21,22,23	NEW CLINIC AND POLICLINIC FOR DENTAL, ORAL AND MAXILLARY PATIENTS JUSTUS-LIEBIG UNIVERSITY, GIEBEN		
21a	Exterior view of the clinic	:	103
21b	Treatment bay in the Policlinic	:	103
21c	Section of the Preclinical laboratory	:	103
22a	Treatment bay in the orthodontic dept.	:	104
22b	Partial view of the dental mechanic's Laboratory	:	104
22c	Treatment bay for students (Prosthetic and conservatory department)	:	104
22d	Phantom room of the conservatory department	:	104
23a	View into a scientific laboratory	:	105
23b	Layout of the conservatory department	:	105
24,25,26	GRONINGEN UNIVERSITY DENTAL SCHOOL		
24a	The front elevation	:	109
24b	One of the spacious surgeries in the Prosthetics department	:	109
25a	A cubicle and equipment	:	110
25b	Central sterilization department	:	110
25c	One of the many laboratories for students in Prosthetic department	:	110
25d	Reception area and central files	:	110
26a	Lecture room	:	111
26b	The central dental laboratory for the clinic's dental Technicians	:	111
26c	A treatment room and equipment	:	111

CHAPTER 1

INTRODUCTION

Dentistry is the art and science of treating diseases of the teeth and of other parts of the mouth. The Dentist defines his area of responsibility as extending within the mouth from the inner border of the lips to the entrance of the throat. Dentists help to keep people healthy in many ways. They correct deformities of the teeth and mouth. Some specilize in making replacement, for teeth and other parts of the mouth. They prescribe medicines and many perform operations on the mouth and jaws.

1.10 THE HISTORY OF DENTISTRY

Dental problems have afflicted man since prehistoric times, when the coarse food of the cave dwellers wore their teeth down to the gums, pre-historic men used both magic and medicine to treat pain, including that caused by teeth. Probably the first attempts of treatment took place in ancient Egypt,,where medications were applied to the teeth. In the 5th century B.C. the Greek Physician Hippocrates, known as the "Father of Medicine" gave clear description of dental diseases and accurately described the anatomy of the mouth. Hippocrates also discussed treatment such as the wiring of the teeth together to splint jaw fracture. Techniques of wiring loose teeth and constructing bridges were developed by the Phoenicians at about the same time. In ancient Rome bridge work was used to replace teeth by attaching the missing tooth to the adjacent teeth.

Dentistry developed slowly. During the middle Ages barbars served as doctors and dentists. Tewelors and other craftsmen made dentures. In the 16th Century dentistry began to become distinct from general medicine.

Methods were developed for drilling decayed teeth and filling them with gold leaf. Pierre fauchard, the "Father of Dentistry" stimulated the development of Professional literature on dentistry. It was not until 1900 that dentistry became a prefession. In that year the first dental school was organised in Baltimore. Since then there had been important progress in dentistry, the discovery of the X-ray in 1895 gave dentist a way of looking inside teeth to discover their defects. In 1910 Sir William Hunter and Sir Kenneth Goodby of England, pointed out that infected teeth could cause infection to spread throughtout the entire body.

The discovery of anesthesia was one of the important farward in the history of dentistry. On December 11, 1844 Dr. Horace Wells a dentist, took loughing gas before having a tooth extracted, the tooth was pulled without pain, loughing gas or Nitrogen oxide,combined with oxygen is still used to make tooth extracted painless.

Two years after Wells discovery, William Marton, also a dentist gave a public demonostration of the use of ether as an anesthetic during a surgical operation.

Quieter, faster, drilling equipments, aimed at taking discomfort out of drilling, was developed in the 1950s. These drills worked at such high speeds that they reduced pain caused by heat and pressure.

1.20 DENTAL SCHOOLS IN NIGERIA

Nigeria with a population of about 100 million has only four dental schools Dr. A.O. Osakwe retired Medical Director of the Nigeria Railway Corporation put the ratio of Dentists to Nigeria population at 1:50,00 which is far too much. There are too many people to a dentist. All the existing schools of dentistry except that of Lagos were not pre-designed for the purpose, and they are all not up to the expected or required standards.

The first dental school in Nigeria was established in 1967 as part of the College of Medicine Lagos, with an initial intake of six students per year the capacity has now increased to about 20 students. To meet the rising demand, a post-graduate programme has recently been incorporated in to the curriculum of the school. Further more, the dental school has expanded over several stages from one department to five departments in 1972. It has now achieved a considerable amount of autonomy as dividion of dentistry headed by a Dean.

Following the recommendation of the National University Commission (NUC) in 1975, that Universities which have Medical facilities, could established dental schools sparked off three new schools at Ibadan, Ife and Benin.

The school of dentistry Ibadan was established in 1977. A maternity clinic and the Doctor's bungalow was converted to the school. The students intake is 25 students per session now, they are admitted after passing the A-levels examination and the course last 5 years after which a student bags a Bachelor of Dental Surgery.

School of dentistry Ife was established in 1977. A floor in the College of Health Science is used. The course lasts 7 years after which a student is awarded a degree of Bachelor of Dental Surgery.

1.30 DENTAL HEALTH CARE

Dental health care is the filling, cleaning teeth removing and filling of artificial teeth.

As long as the mouth remains the entrance to the body cavity, the entire body system could be poisoned through bad teeth and other dental diseases.

Investigations revealed that the teeth actually determine the structure of the facial outlook, and this however confirmed reason why (Prostectics) replacement of lost teeth is necessary. On why people who had lost their teeth look older than their ages, this is when the alveolar bone, which acts as structure of the facial out look collapses it will give the appearance of an increasing age.

1.31 DENTAL DISEASES

The most common of the dental diseases is dental decay (cavities) which may affect both children and adults, but is particularly severe in the 3 to 21 age group. If untreated, decay may cause excrucianing tooth-ache and eventually, loss of the affected tooth. Decay is caused by the consumption or over consumption of refined carbohydrates meaning sugary foods like sugar, ice cream, chewing gum, sweets, biscuits, soft drinks and so on. It is the bacteria working on the remains of these sugary foods that produce the acid which initiate the process of dental decay on a tooth that is weak, which is a tooth with less floride iron.

There are also man made ailments like the cases of broken facial bones resulting from accidents, or it could be a case of malocusion in which case a man comes into adulthood dentally deformed may be with a set of not properly arranged teeth, gap in the teeth, teeth not properly meeting or not meeting at all, or they could protrude and go beyond the lips. This may result from loss of teeth, from disturbances of normal alignment caused by such habits as thumb sucking, or from improper placement of the tongue when swallowing. These deformities can be corrected by a specialist dentist called orthodotic, such defects can be checked

at the infancy stage of the baby's life. Where proper guidance of the baby teeth served to fashion the shape of the permanent teeth to come.

There is also the gum diseases which are common amongst the older generation, particularly those over 50 years, this is responsible for the loss of the thousands of teeth yearly.

There are also tumour formation which is often called cancer of the mouth. One of the commonest of these is the burkitts lynphoma, which begins as a swelling in the gum with no initial pains or discomfort. It grows bigger quickly, however, disturbing the eating habit of the patient by interfering with the teeth meeting together. It soon gets infected and within one month the whole mouth may be filled. It normally occurs in children between the ages of two to ten, and it is believed to be carried by mosquitoes viruses since this cancer is only experienced in tropical areas where there are mosquitoes.

There is also the squamons call cerunoma which begins usually as a small ulcer in the mouth usually the tongue. This ucler does not heal and hurts the patient whenever he eats pepper. It does not cause any pain at all by itself and could be there for about three months, later it starts a bleed and soon speech is affected and can not move freely. This stage is the cancer stage and becomes fatal as soon as it spreads to the other parts of the body.

1.32 DIAGNOSIS AND TREATMENT

The dentist uses X-ray to locate areas of decay in the teeth, abcesses, and tumors within the jaw bones, and to determine the extent of bone loss around the teeth. X-rays also defect teeth which have not emerged from the jaw (impacted teeth). X-rays of a child's mouth may reaveal the presence of permanent adult teeth, enabling the

dentist to determine whether they are so positioned as to develop normally, this can be seen in (fig.1.1)

The alignment of the teeth can be carefully studied by means of plaster reproduction of the mouth, obtained by pouring plaster of paris in to impressions of the mouth. The dentist frequently uses such reproductions to plan surgery of the jaw or to study approaches for reshaping and covering the teeth to provide proper acclusion and appearance.

Tooth-cutting instruments are used to prepare cavities for fillings and to reshape teeth so that they may be covered with porcelain, plastic, gold or with combinations of these materials. The greatest mechanical advance in dentistry in recent decades has been the deveeloyment of cutting instruments which rotates at speeds of up to 500,00 rpm, as compared to 7,000rpm for the eariler models. There high speed instruments almost completely eliminate the uncomfortable vibrations of the slow-speed drills. They are easier to control and substaintially reduce the time needed to complete an operation.

1.33 REPAIRING AND REPLACING TEETH

Root canal therapy, or endodontia, may save a tooth with an infected or decay pulp. The diseased pulp is removed from the tooth, creating a canal which is then sterilized, enlarged, and finally filled with gutta-percha or silva paints.

Damaged or decay teeth may be repaired by tooth coverings, or crowns, prepared from porcelain, plastic, gold, or combinations of those materials. In deteriorated mouth the teeth may be reconstructed so that they bite properly, avoiding further bone damage from malocclusion. This is known as occluso-rehabilitation.



X-Ray Showing
Permanent dentition

Fig 1.1

Lost teeth are replaced by artificial teeth made of plastic, porcelain or gold, permanent, or fixed dentures are cemented to the neighbouring teeth. Removable bridges are attached to the remaining teeth with clasps and various friction devices. Full dentures are used when all the teeth are missing. They are held in place principally by the closeness of fit between the denture and the contours of the mouth.

1.34 PREVENTION

The major way of achieving good dental health care is by regular brushing of the teeth first thing in the morning and last thing at night. Not merely brushing but thoroughly washing the nooks and conners of the mouth.

Dental diseases can also be prevented by seeing the dentist at least ones a year for regular cleaning to get rid of the hard and soft deposite and stains.

Floride irons can also be given to children in the early age to help develop a strong teeth when deficiency of floride iron is noted.

Sealant can also be applied to a child's teeth during the childhood which will be removed later.

Eating a well balanced diet also help prevent dental diseases. Detergent foods, such as raw fruits and vegetables help cleanse the teeth and massage the soft tissures. These are effective at the end of a meal or after eating sweets, especially if brushing is impossible. Rinsing with water is also better than nothing when brushing impossible.

Eating between meals should be discouraged, particularly if foods contain sugar, except in special instances.

Floridation of community water, supplying one part of water is the most effective and preventive agent

in the control of dental diseases.

FOOTNOTE

1. Dental health by Professor H.H. Stones.

2. A textbook for Dental Assistants by Park Ashman Shelly 1975.

3. Sunday-times March, 9th 1986
1st article - Don dig your grave with your own teeth by Ndubisi Okwechime and Dupe Adesioye.
2nd Article - The body could be easily poisoned through the mouth by Fatai Aruna.

CHAPTER II

DENTAL SCHOOL DEPARTMENTS

The school of dentistry, New Ahmadu Bello University Teaching Hospital, Zaria, shall comprise of the following departments:

- Administrative Department
- Reception of patients, Record stores and Pharmacy
- Diagnostic Clinic
- Department of oral surgery, oral medicine and wards
- Department of Preventive Medicine, Social Dentistry and Periodontology
- Department of Conservation, Prosthetics and Pedodontics
- Department of Oral Pathology and Biology
- Students Training Unit
- Ancillary facilities

2.10 ADMINISTRATIVE DEPARTMENT

This department contains offices for normal running of the school. It also contains offices where datas about the school are gathered and documented as well as offices where these datas are used. Administrative department deals with public relations matters employment, purchasing of school and clinic materials and equipment. This department is divided into two major parts. Central Administrative Unit and Academic Units.

2.11 CENTRAL ADMINISTRATION

This is one of the focal points of a dental school, though, it should be readily accessible to visitors, it need not be in a predominant location.

This department deals with the overall running of the school. It is headed by a Dean. In planning his office space must be alloted for the Dean's private study and his Secretary with due regards paid to the need for book shelves, filling space, office supply, storage and waiting area for visitors. A conference room is also necessary. In addition, Finance officer's room, General Office, Administrative Officer's office and toilets for male and female staff will be needed.

2.12 ACADEMIC UNIT

This is the departmental office requirement. Each basic science and clinical science department head requires office space, for its departmental activities and laboratories for research; table space enough to accommodate small staff or student conference, located near his research laboratory and adjacent to the Secretary's office. There should also be offices for a Reader, two Senior Lecturers, other Lecturers and toilets for male and female staff.

2.20 RECEPTION OF PATIENTS, RECORD STORES AND PHARMACY

The reception area is the main waiting room. It is the control centre of the clinics, coordinating the flow of patients and records to clinics in the treatment area. In addition the work of the appointment desk is closely coordinated with that of the clinic business office. Frequently the information, registration appointment desk are combined.

This should be the focal point and readily accessiable to patients. It needs to be in a predominant location. It is the first point of call of patients both old and new one. The new patient first reports to the information desk. He then proceeds to the information desk, then to the registration desk where a case record is opened for him. At the appointment desk, his next stop, he is schedule for an oral examination.

PHARMACY

The main function of the pharmacy Unit is the dispensing of drugs to inpatient wards, and out-patient department. Facilities should be provided for goods reception and storage, assembling of individual ward orders, preparation of small quantities of special sterile product and a special dispending counter for issuing prescriptions to out patients.

It can be cuitably located on the ground floor since it must be related to internal and external supply routes and to the departments.

In locating a pharmacy, special security precaution ought to be made against intrusion and theft and alarm system should be provided.

CENTRAL RECORDS

An essential part of the operation of a dental practice is the keeping of good records of both professional and financial information, it is divided into three main parts. One for dead patients, one for patients who have stopped coming and the last one for new cards and patients who are on appointments.

2.30 DIAGNOSTIC CLINIC

Patients visiting the clinic for the first time goes to the diagnostic clinic first where the nature of the dental problem is determined and a plan of treatment formulated.

The essential facilities in the diagnostic clinic include examination rooms with dental chairs, emgergency room, central radiology unit, demonstration rooms for students, rest room for sisters, offices for sisters and toilets for male and female.

2.31 EMERGENCY ROOM

The function of an emergency department includes, reception, resucitation, treatment of accident patient, those in great pain thereby needing urgent treatment.

Emergency treatment room should function as a part of the diagnostic clinic or possibly the reception area. Either a series of single chair rooms or one large room with two or three dental chair practical. Although emergency treatment rooms are sometimes included in each of the clinics in the treatment area, the provision of central facilities is more practical to assure that the rooms are not pre-empted for some other purposes. External access for emergency ambulance should be a priority and there should be separate entrance for walking and strecher patients. There should be direct access to the X-ray department. There is also need for quick access to the main operating theatre and the intensive care unit.

2.32 RADIOLOGY UNIT

The duty of this unit is the production of photographic films of the head region, it is produced by the action of X-rays on specially sensitized films, for use in the diagnostic work in a dental clinic.

The unit should be placed centrally in the neighbourhood of the rooms for preliminary examinations and within easy reach of the various departments. The size of the X-ray booth should be chiefly based on the number of students admitted per session. In addition to that one or two decentralized X-ray booths for inter oral radiography especially in the conservative department are required.

Rooms containing radiography machines must be shielded through the use of leadlined walls and partition of appropriate building materials of an adequate thickness in addition, controls for radiography machines should be located behind shielded partition.

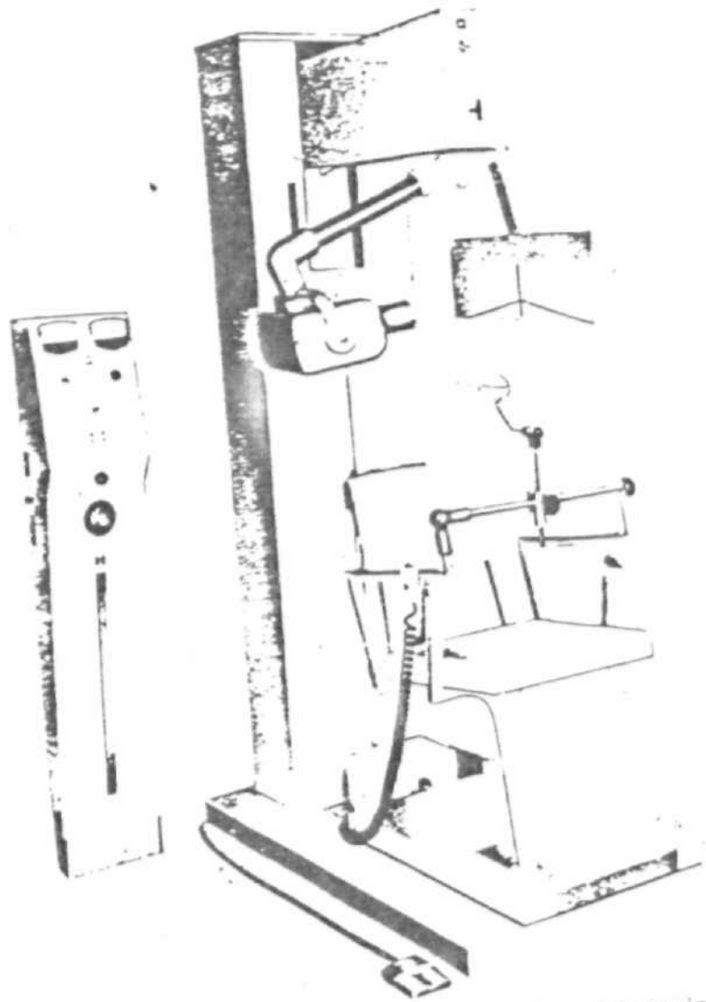
A suite of rooms for film processing includes a darkroom, oversized to permit group instruction, a wet viewing and drying room, and a mounting room. A framed opening in the wall between the drying and mounting rooms is used for passage of film. The mounting room accommodates eight students. Each student position has a view box built into the surface of the bench.

Air-conditioning in the dark room and wet viewing room is desirable not only for the comfort of the personnel but for the protection of exposed film. Maintaining air at positive pressure will prevent dust from entering around windows and doors. The different types of radiographic equipments can be seen in fig. 2.1 to 2.5

2.40 DEPARTMENT OF ORAL SURGERY AND ORAL MEDICINE

Oral surgery is the dental special dental care with the diagnosis and surgical adjustive treatment of diseases, injuries and defects of the mouth, jaws and associated structures by surgery, broken jaws injuries caused by automobile accidents and harelips are among the conditions treated by the oral surgeon.

He removes tumors from the mouth also extracts teeth, including impacted wisdom teeth some of this diseases can be seen in fig. 2.6. Oral medicine is the treatment of oral manifestations of systemic diseases



Panoramic x-ray unit. Patient's head remains fixed while the film and x-ray source rotate around it. The chair usually shifts automatically during the exposure. (Courtesy Dental Products Division.)

Fig 2·1

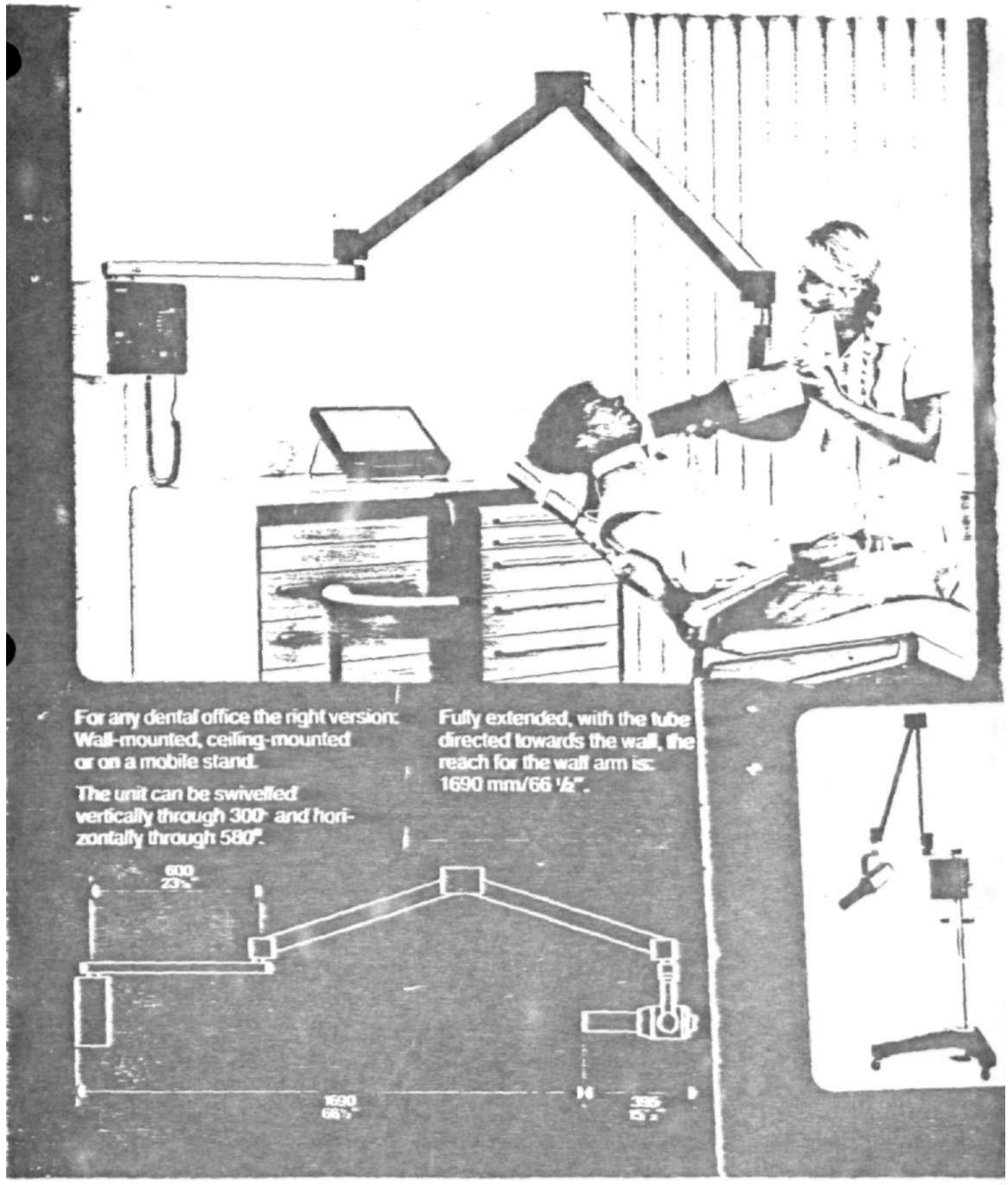
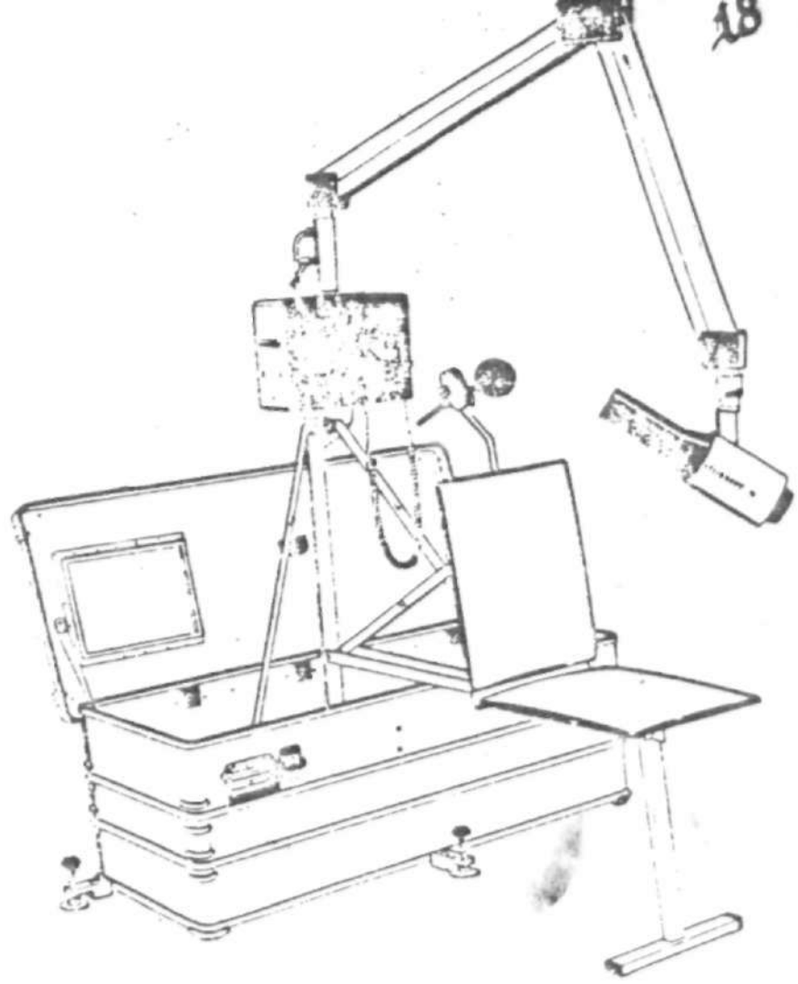
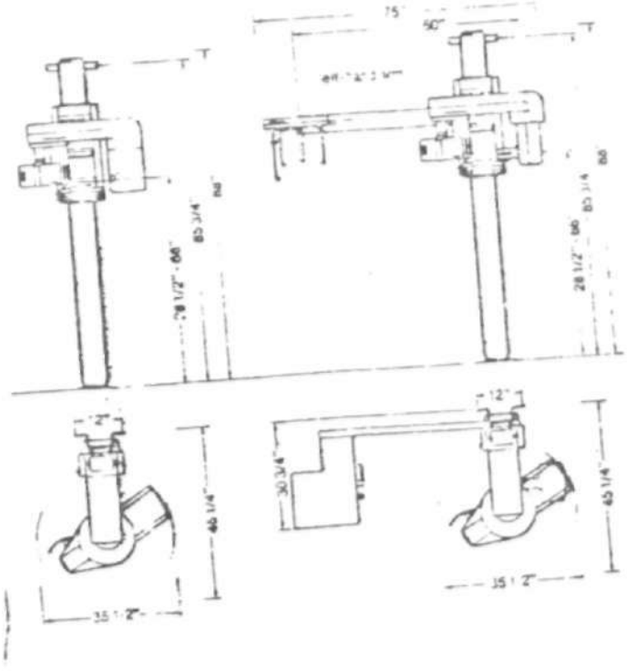
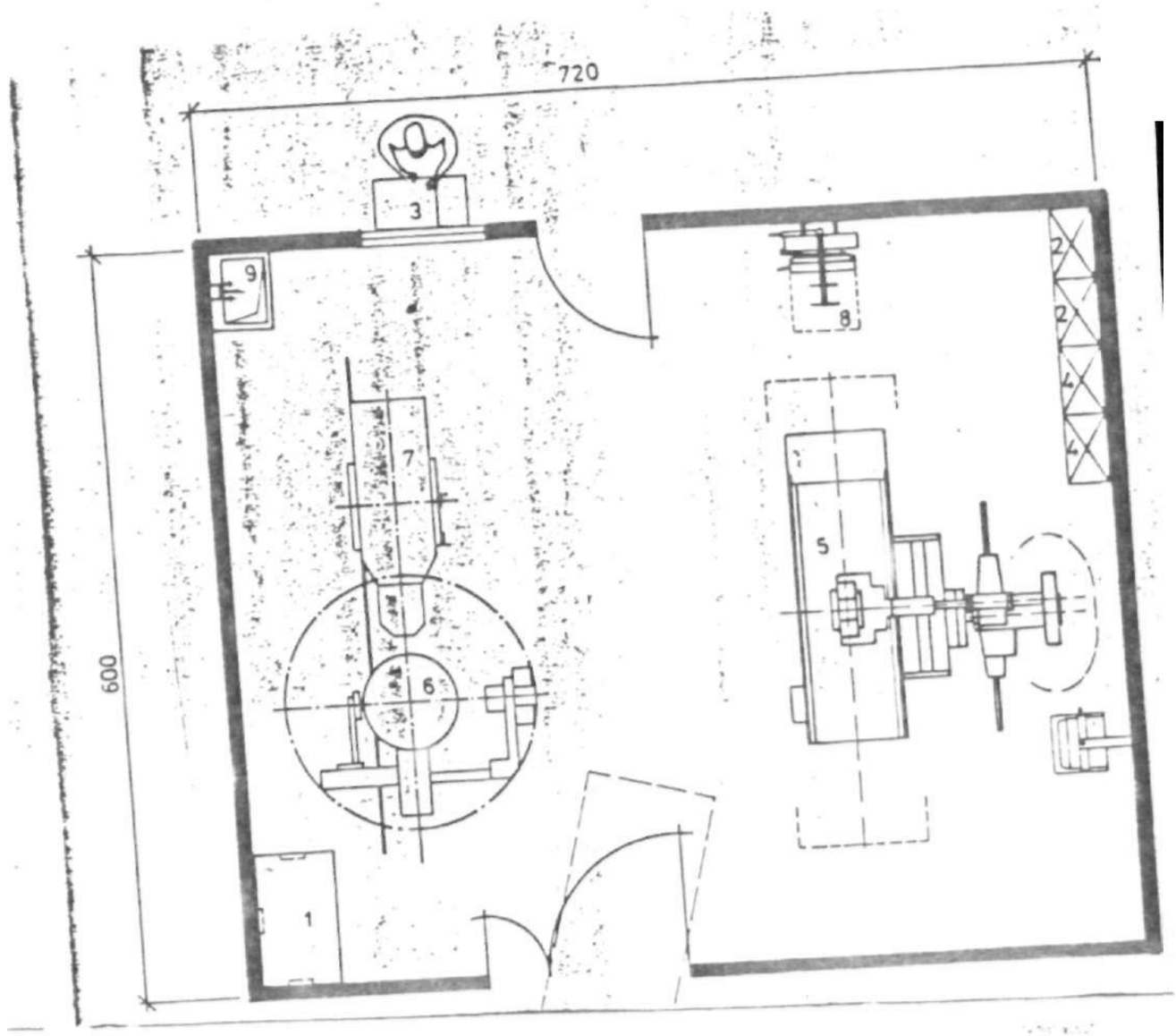

For any dental office the right version: Wall-mounted, ceiling-mounted or on a mobile stand.
The unit can be swivelled vertically through 300° and horizontally through 580°.
Fully extended, with the tube directed towards the wall, the reach for the wall arm is: 1690 mm/66 ½".
600
23⅝
1690
66½
395
15½

Fig 2.2



Dimensions of some x-ray equipments (Fig 2.3)

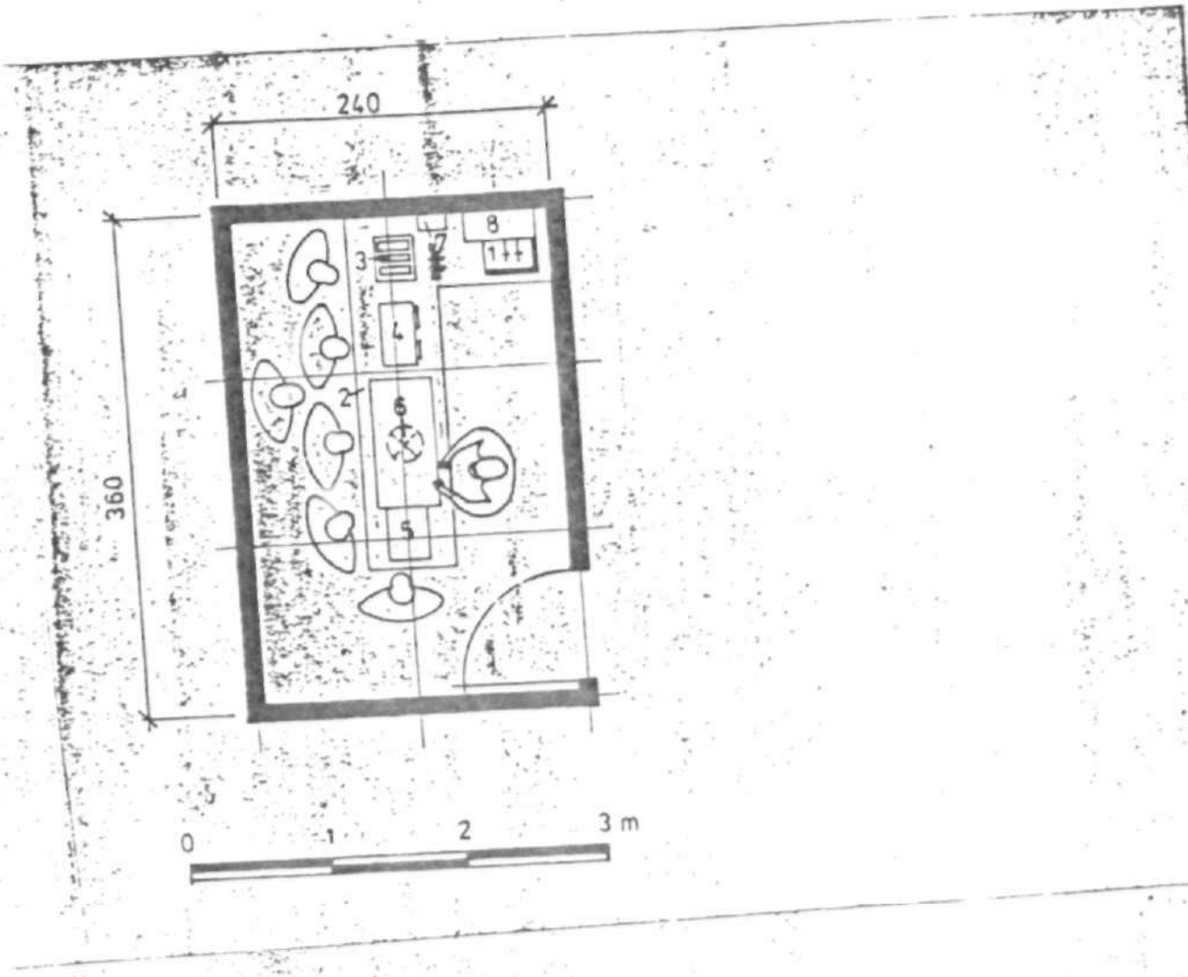




Example of a large X-ray room (tomography and skull radiography)

1 Generator TRIDOROS - OPTIMATIC
a) H.T. Generator
2 b) Electronic cabinets
3 c) Central and control consoll
4 Mounting cabinets
5 MULTIPLANIMAT . I.I. . TV
6 ORBIX
7 Special table TIT - 12
8 VERTIX
9 Wash basin

Fig 2.4



1 Sink
2 Darkroom cupboard
3 Tank processing
4 Automatic processor for dental films PROCOMAT
5 Automatic processor PANTOMAT
6 Darkroom lamp, ceiling model
7 Darkroom lamp, wall mounted
8 X-ray film viewer

Example of a darkroom

(With demonstration for intraoral and panorama radiographs)

Fig 2.5



• Cancer of the mouth that has eaten deep into the jaw

• Distorted face and mouth due to cancer of the mouth

DON'T DIG YOUR GRAVE WITH YOUR OWN TEETH

Types of cases treated in surgical clinic (general anaesthesia).



• Cancer of the mouth which began as tooth decay leading to abscess



• Cancer of the mouth

Fig 2.6

and deficiencies prevention and correction of oral diseases.

The functional area of the department include an Academic unit and two clinics namely extraction clinic (local aneasthesia) and extraction clinic general aneasthesia)and wards.

2.41 EXTRACTION CLINIC (LOCAL ANEASTHESIA)

Minor operations are done here. Aneasthesia is given just for a part of the body depending on the part to be treated. Patients here are mostly amblant. The functional area of this clinic include:

(a) Aneasthesia room
In which the aneasthesia injection is given to a patient.

(b) Consultation rooms
Special care should be taken in the internal detailing of floor finishes and grabrails. Steps should be avoided as many patients with varying degress of disability will be treated.

(c) Recovery room - For faint or bleeding patients. This room needs to be well ventilated.

(d) Diagnostic laboratory - Is the place where quick analysis of specimen can be done bofore or instead of sending it to the big laboratory.

2.42 EXTRACTION CLINIC (GENERAL ANEASTHESIA)

The major operations takes place in this clinic and the functional requirements include an operating theatre, aneasthesia room, scrub up room, store and disposal room. Some of the types of diseases treated can be seen in (fig. 2.6).

2.43 OPERATING TRACT IN A DENTAL HOSPITAL

The operating theatre is one of the most important and most complicated part of any dental hospital, it's function is to receive patients to be operated upon, aneasthesize them, operate on them and supervise them post-operatively untill they are returned to their wards.

The primary design consideration is therefore the patient, his comfort and safety must be ensured suite of the patient implies that the operating suite must be free from bacterias and infections to obtain this the best aseptic central technique must be applied. Patients comfort on the other hand requires that the best climatic condition for the patients, must be maintained during operation procedures.

In the operating area of the dental hospital, which to date has usually been subjected to such strict of hygiene as apply in other surgical disciplines, the more sophisticated requirement which are employed in the latter case are now also employed in the dental hospital in future planning. Accordingly the operating theatres are provided with a system of surrounding rooms that have the effect of a maze to prevent the transmission of pathogenic material and staff routes.

The Patient - is moved from his bed via the patient maze onto the operating table top and then moved into the sterile area. After preparation and induction of aneasthesia, he is then taken into the operating theatre. Following the operation, he is conveyed via the extubation area and the patient maze into the recovery room from here, he is returned to the intensive care unit or the surgical ward.

The Staff - disrobes in the staff maze following this, hands are disinfected and operating room clothing are been put on, following the operation, the staff removes the operating theatre apparel in the disrobing room of the staff maze, putting on the previously discarded clothing again. If further surgery is planned the cycle starts over again after the removal of the operation clothing.

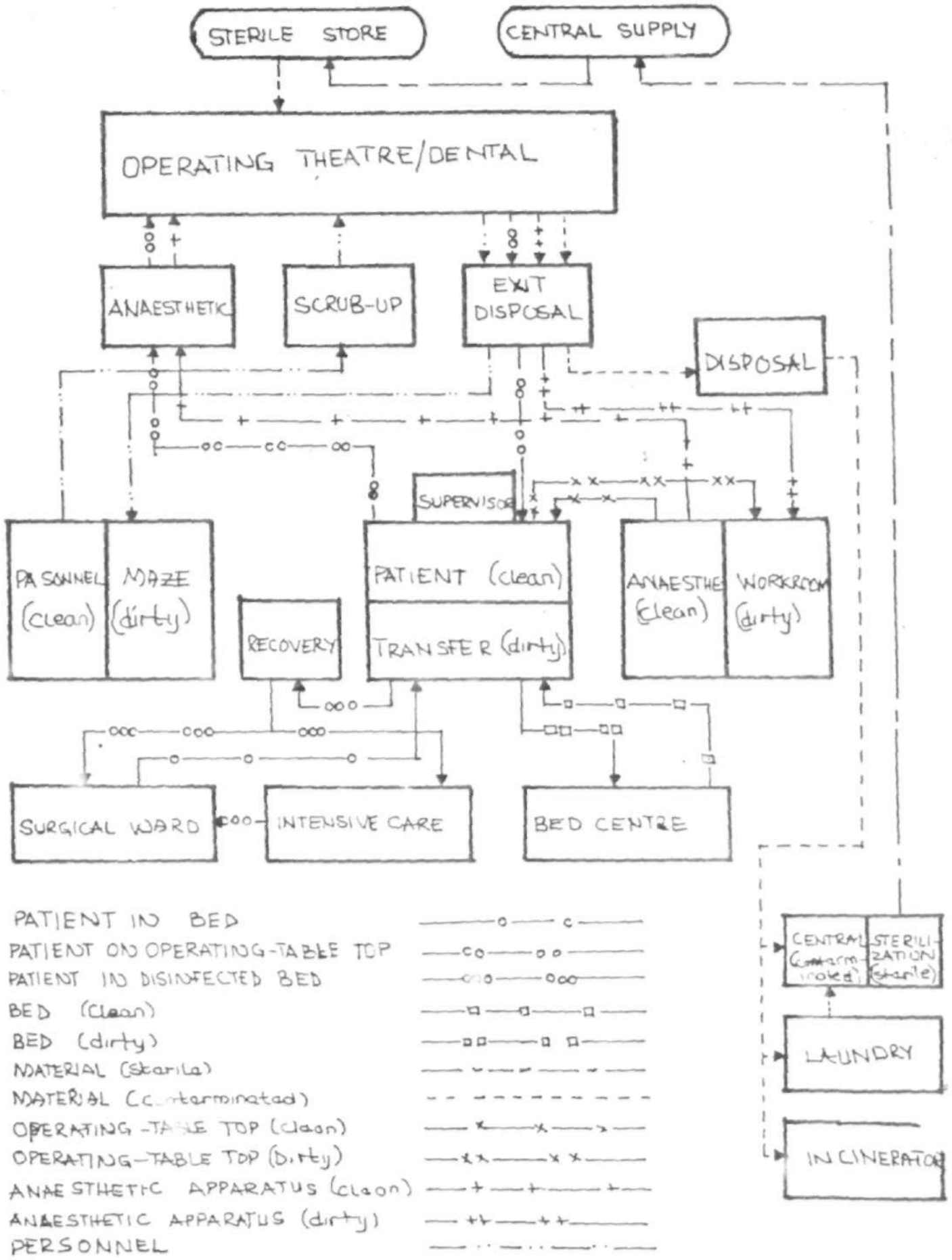
The Sterile Material- (Instruments, textiles etc) is brought up from the sterilization area, if expendient, via lift for sterile material, into the sterile store (supply) and is here laid out for each operation separately.

After the operation, the soiled material is collected in the soiled- material room and then conveyed into the processing areas such as, for example, equipment cleaning, central sterilization. laundry and waste collecting area, if expedient via a materials left. This is illustrated in (fig. 2.7 - 2.28 and 2.10).

Aneasthesia And Ventilation Equipment: are disinfected in the aseptor which should be arranged between the non sterile and sterile parts of the aneasthesia workroom (fig. 2.8) shows the functional flow diagram of an aseptic dental surgical department.

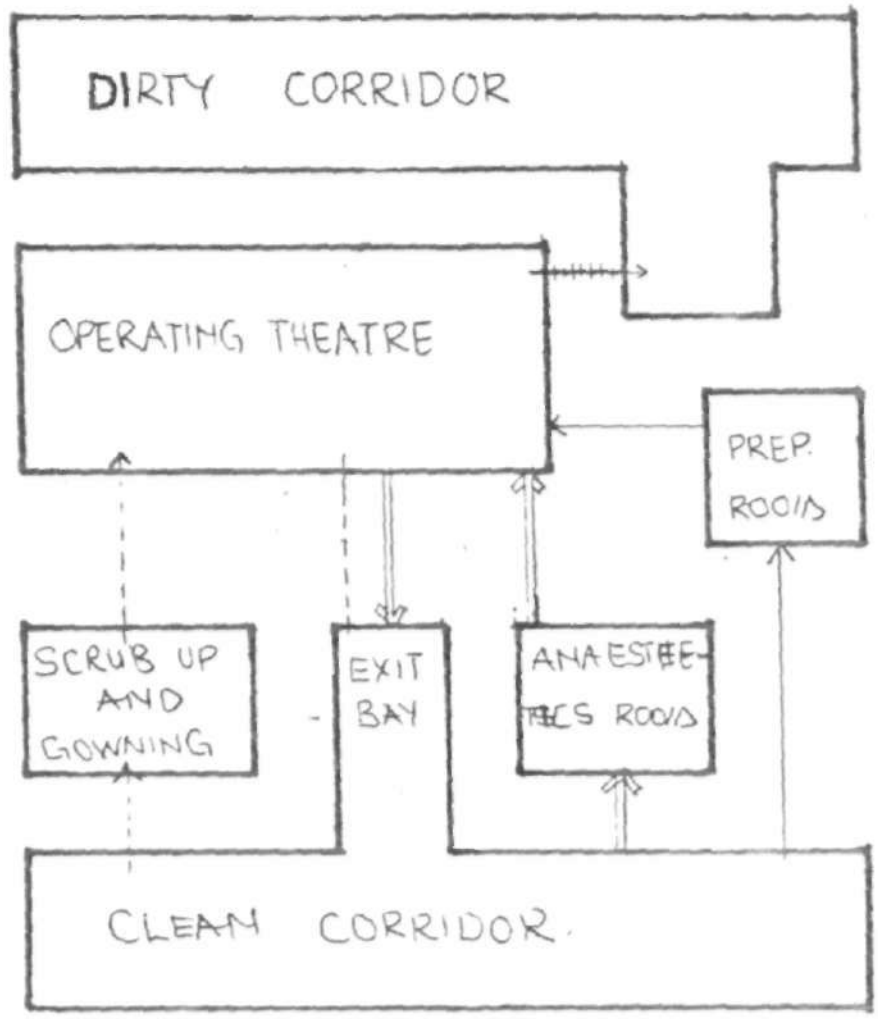
Figure 2.9 to 2.13 shows an example of a dental operating theatre, aneasthetic room and a scrub up room, it shows also the equipments needed and their arrangements.

In the operating theatre for dental surgery, 6 to 8 operations can be carried out per day, therefore for dental hospital of standard size 30 students per session one operating theatre with two operating chairs and associated function rooms are usually adequate.



FUNCTIONAL FLOW DIAGRAM OF AN ASEPTIC DENTAL SURGICAL DEPARTMENT.

Fig 2.7



PATIENT

STAFF

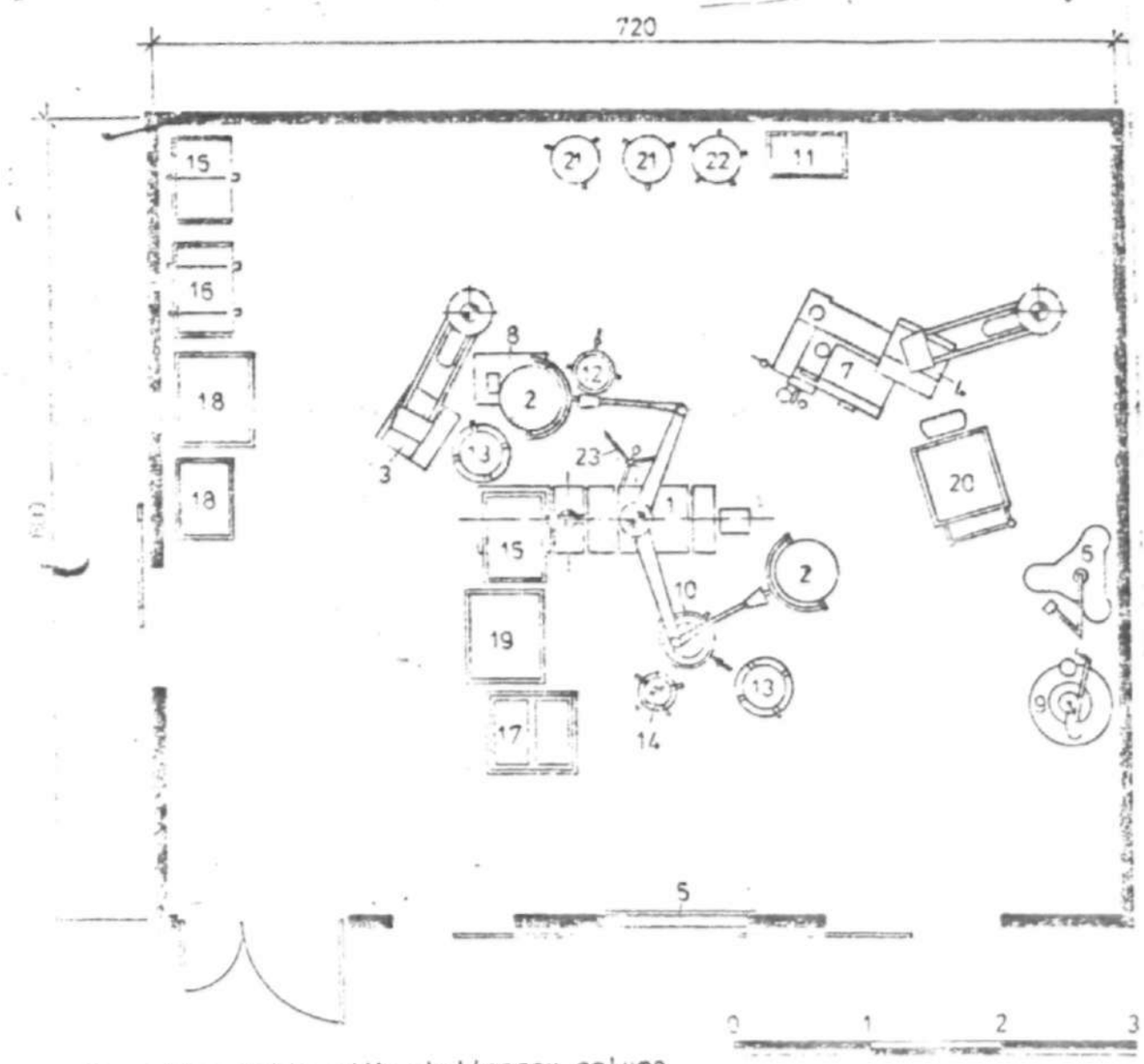
CLEAN AND STERILE SUPPLY

ITEMS FOR DISPOSAL OR REPROCESSING.

FIG. OPERATING THEATRE FLOW DIAGRAMS.

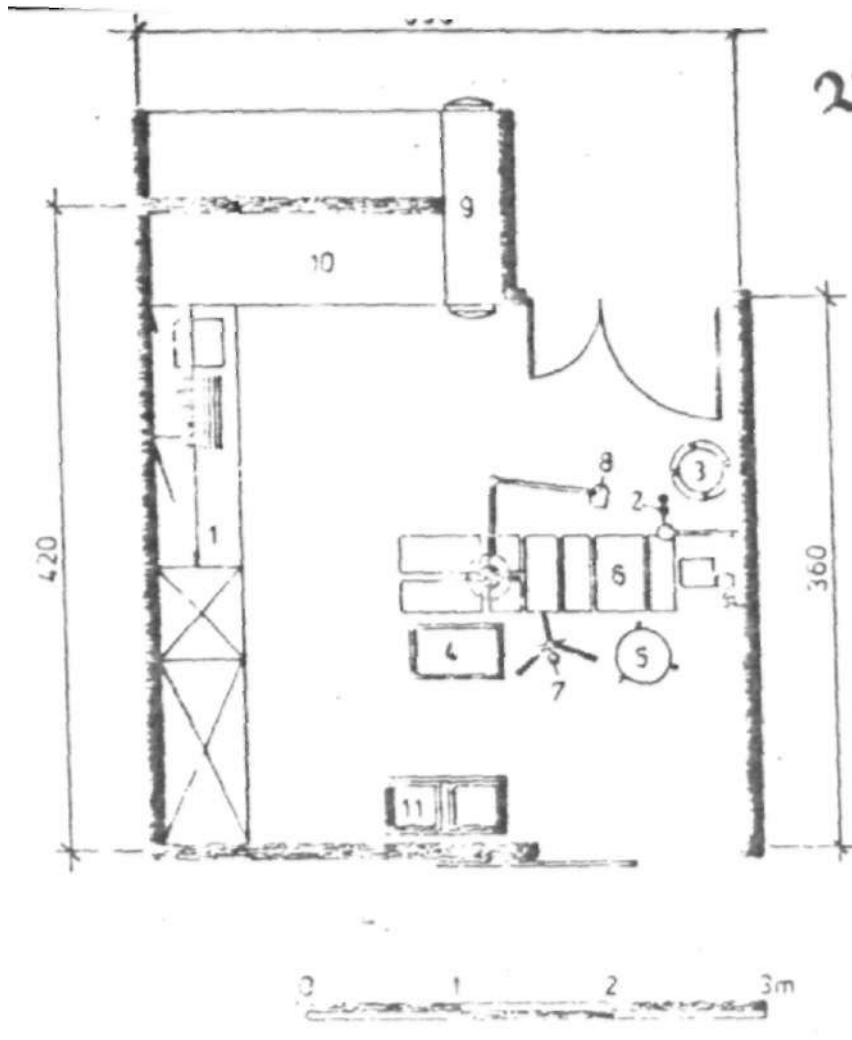
Fig 2.8

Example of a dental Operating theater



1 Operating table with stationary column
2 Operating light
3 HF-surgery box on universal swivel stand with RADIOTOM 704, grounded sockets and gas box
4 Anaesthetic box on universal swivel stand with SIRECUST 300 measuring facilities system grounded sockets and gas box
5 X-ray film viewer
6 Operating microscope
7 Anaesthesia apparatus
8 Surgical suction unit
9 Drilling machine
10 Soiled instrument receptacle
11 Operator's foot stool
12 Bowl stand
13 Kick bucket
14 Bowl stand with heating equipment
15 Instrument table
16 Dressing container stand
17 Instrument tray trolley
18 Instrument trolley
19 Suture material table
20 Anaesthesia cart
21 Operator's swivel stool
22 Mobile operating swivelling stool
23 Infusion stand

Fig. 2-9



1 Anaesthesia wall cabinet
. with washing unit
2 Anaesthesia apparatus
3 Kick bucket
4 Syringe table
5 Operator's swivel stool
6 Operating table top on transporter
7 Infusion stand
8 Additional ceiling light
9 Autoclave
10 Work table
11 Soiled linen trolley

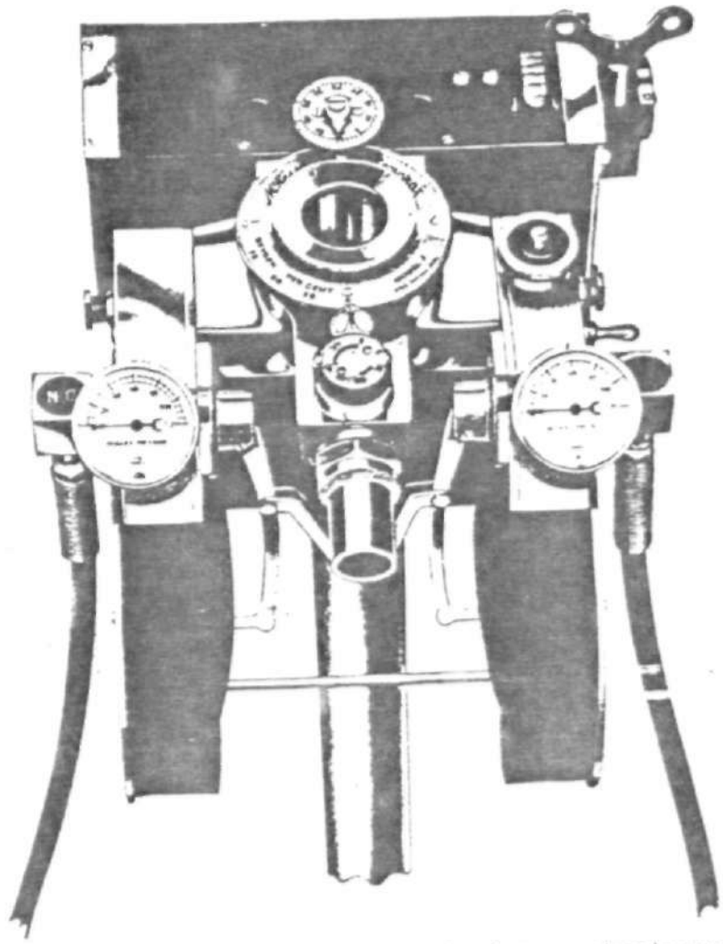
Fixpoint

Example of Exit/Disposal with Immediate sterilization

Surgical department

Fig 2.10

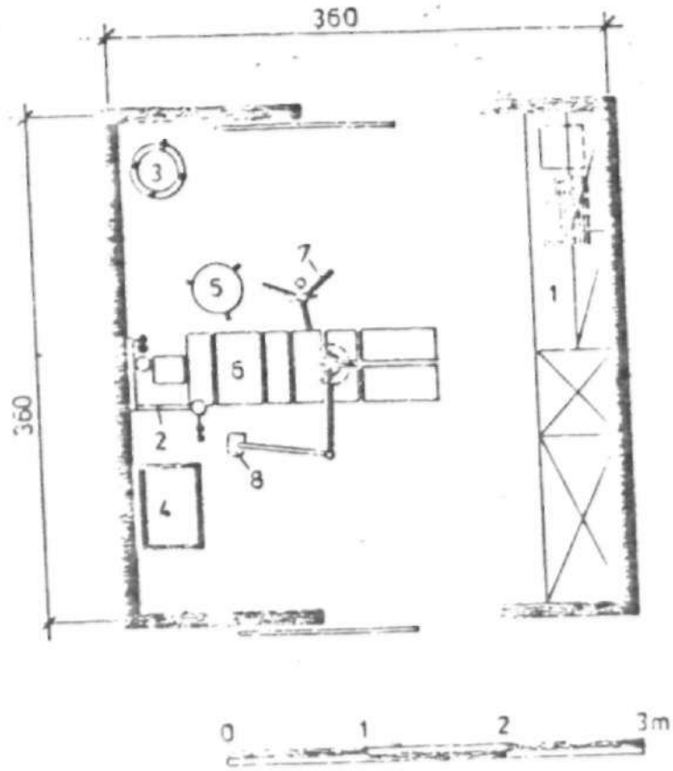
ANESTHESIA ROOM EQUIPMENT.



The McKesson machine for the administration of nitrous oxide and oxygen.

The most common general anesthetic agents used for dental surgery are nitrous oxide gas and Vinethene (divinyl ether). Sodium pentothal is often used intravenously. All these are cerebral depressants, which affect the conductivity of both sensory and motor neurons. Moreover, when nitrous oxide or any other anesthetic is administered it is essential to provide the patient with an adequate supply of oxygen, and for this reason the machine used to deliver nitrous oxide will also deliver any desired amount of oxygen (Figure 16-2). Nitrous oxide tanks are always color-coded with blue paint and oxygen tanks with green paint. The operation of a machine of this type with the skill necessary to anesthetize patients safely requires training and experience.

Fig. 2-11



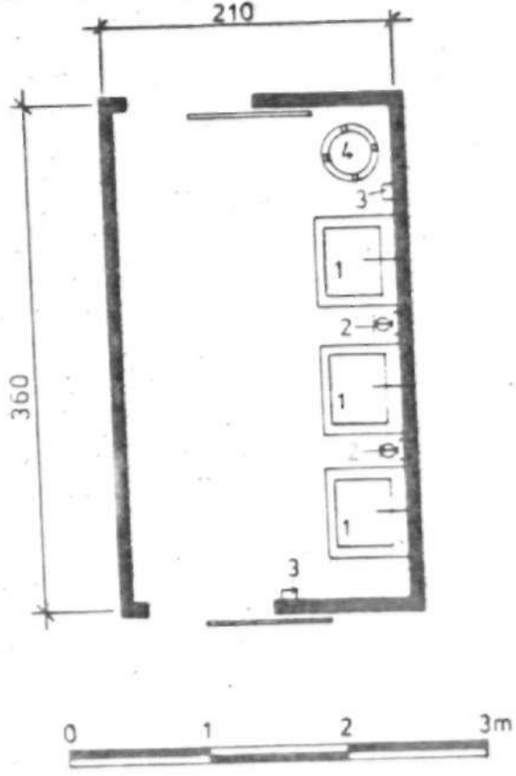
1 Anaesthesia wall cubinet
with washing unit
2 Anaesthesia apparatus
3 Kick bucket
4 Syringe table
5 Operator's swivel stool
6 Operating table top on transporter
7 Infusion stand
8 Additional ceiling light

Fixpoint

Example of anaesthetic room

Surgical department

Fig 212



1 Wash basin unit
2 Disinfectant dispenser
3 Brush dispenser
4 Kick bucket

Fig 2.13

Example of scrub-up

Surgical department

The area of the operating theatre should be approximately 42m^2 and the height of the ceilling at least 3m, if possible 3.2m. In addition to the operating theatre equipment, such as fixed operating table column with removable operating table top, mobile or ceilling - suspended aneasthesia opparatus, operating lamps, etc. the operating theatre must also be provided with a drilling machine driven by compressed air connection must be provided for filtered air having a pressure of 10 bar.

For the Scrub-up room some 7m^2 should be provided for intubation, 12-14m^2 and for extubation and supply room 15-17m^2 should be adequate see plans in figure 2.7 to 2.12. In addition with in the operating theatre tract, but separated by a corridor, an equipment room aneasthesia working room, sterile and unsterile, and a waiting area for operating table tops including cleaning facility, should also be provided the relationship of this functions can be see in fig. 2.7 and 2.8.

In planning the operation theatre, the following determinants are to be noted:

(a) Size of room;
(b) usage;
(c) environmental control
(d) lighting surgical and general illumination;
(e) intercommunications and signal system;
(f) electronic equipment and monitoring system;
(g) service lines eg. suction, oxygen, nitrus oxide, compressed air;
(h) X-ray accommodation for tube stand, central, transformer and lead protection;
(i) television camera movie camera, and other recording equipment;
(j) safety precaution in appliances;
(l) clocks film illuminators.

LIGHTING

Artificial Lighting - in the operating room falls into two categories, general and surgical lighting.

General Lighting - should be distributed over the ceiling of the room to give a high intensity light. There should be uniformity of colour and intensity of light throughout the operating suite to enable the anaesthist to detect any changes in the colour of the patient's skin. It should be free from glare and as much as possible, built flush into the ceiling with a glass or a crylic underside.

The Surgical Light -provided in an operating room should give a powerful, cool, shadowless illumination capable of penetrating to the bottom of deep cavities such that different shades of redness depicting different body tissues can easily be identified. The type of light chosen depend on the type of surgery performed, the ceiling height of the room overhead equipment etc.

Natural lighting - for natural lighting to be used successfully in an operation, the day-light factor 10 must be at least $20\frac{1}{2}$", this calls for very large window areas in both the ceiling and walls of the theatre. To prevent heat loss through large glass areas, condensation on the inner surface of the glass, and to permit accurate regulation of the temperature in the theatre, naturally lit operating rooms must have double windows.

Very serious over-heating may result from large window and skylights, unless there is some form of protection either by external shutters or orientation blinds for such windows are difficult to manipulate as well as expensive.

With the increasing emphasis on air-hygiene, natural-lighting is no longer considered a necessity in operating rooms and many recent designs of operating theatres are

windowless. Windows may however be provided on the ground that daylight even when it has passed through glass, has an important bactericidal effect, and a room with windows of clean glass is more pleasant to work in than a windowless room some of this lights can be seen in (fig.2.14 and 2.15)

Ventilation - the main purpose of artificial ventilation in operating theatres is to keep the level of air-borne bacteria very low and to control peak increase in the count as quickly as possible. Another reason is to provide comfortable working conditions. The main sources of air-born infections in theatre are:

(a) Organisms carried by duct into the theatre in the supply of air or sucked under doors by extract fans or entering through windows (where they extist) or carried in by personnel on their shoes or clothing.

(b) Bacteria liberated from blankets or any exposed wollen clothing in the theatre.

(c) Organism carried by surgeons and other personnel on exposed hair and skin.

(d) Droplets from the nostrils and mouths of all those in the theatre, the patient inclusive.

- Planning good ventilation system, and discipline can effectively deal with factors (a) and (b) while application of skin creams, more efficient masking proper use of sterile covering and the use of sweat-bonds will liminate factors (c) and (d).

The design of the ventilation system must be such that supply air is free from dust.

2.44 WARDS

The ward accommodates patients with various dental problems. The typical relationship can be seen in fig. 2.16.

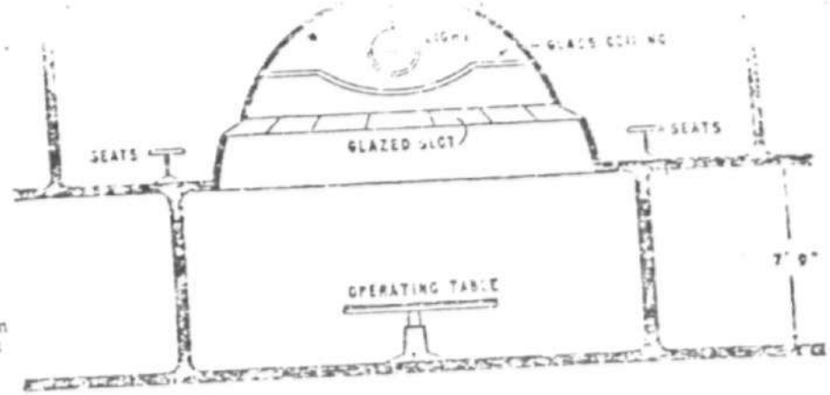


fig 2·14a

Section through Jean Walter's operating theatre at Lille, showing observation gallery and lighting

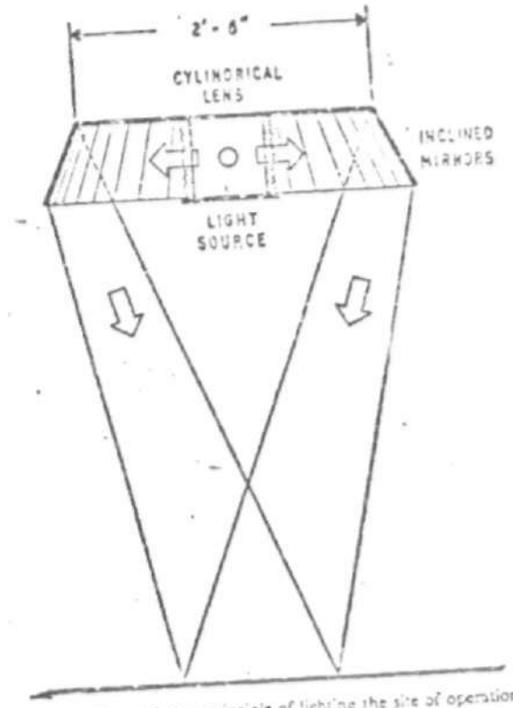


fig 2·14b

The *scialytique* principle of lighting the site of operation from a single light source, shown diagrammatically

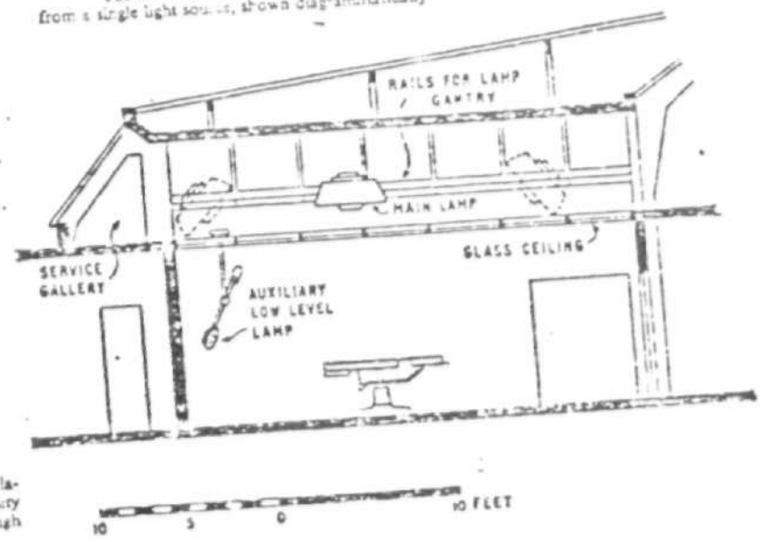


fig 2·14c

The *super-scialytique* installation at the Canton and University Hospital, Lausanne; section through theatre

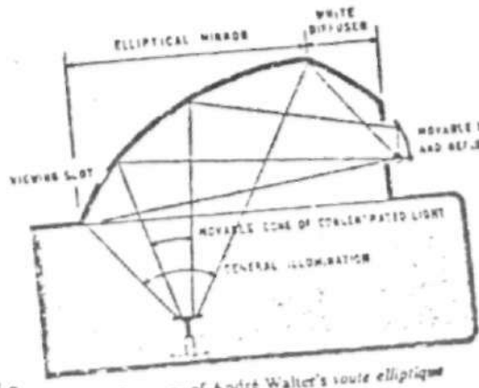


fig 2·15a Diagram of André Walter's *voute elliptique*

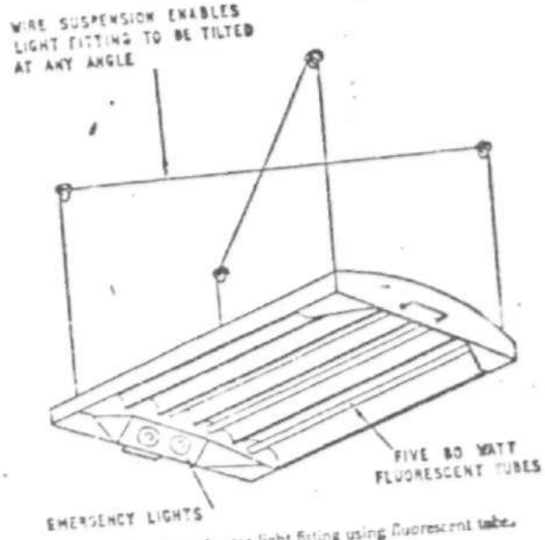
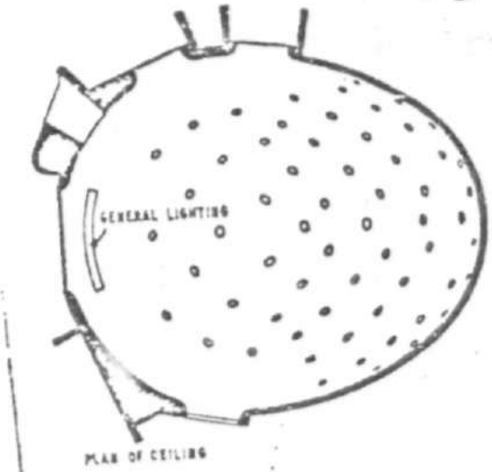
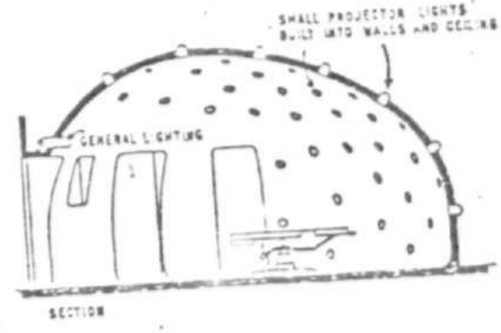


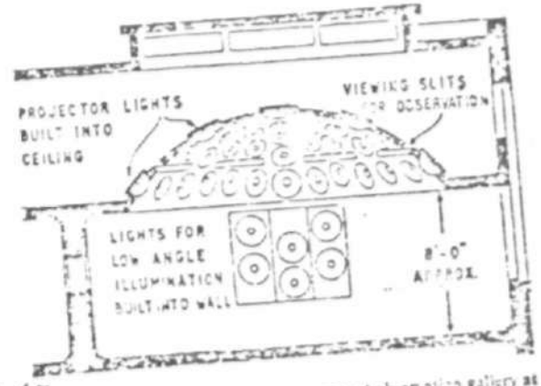
fig 2·15b Operating theatre light fitting using fluorescent tube.



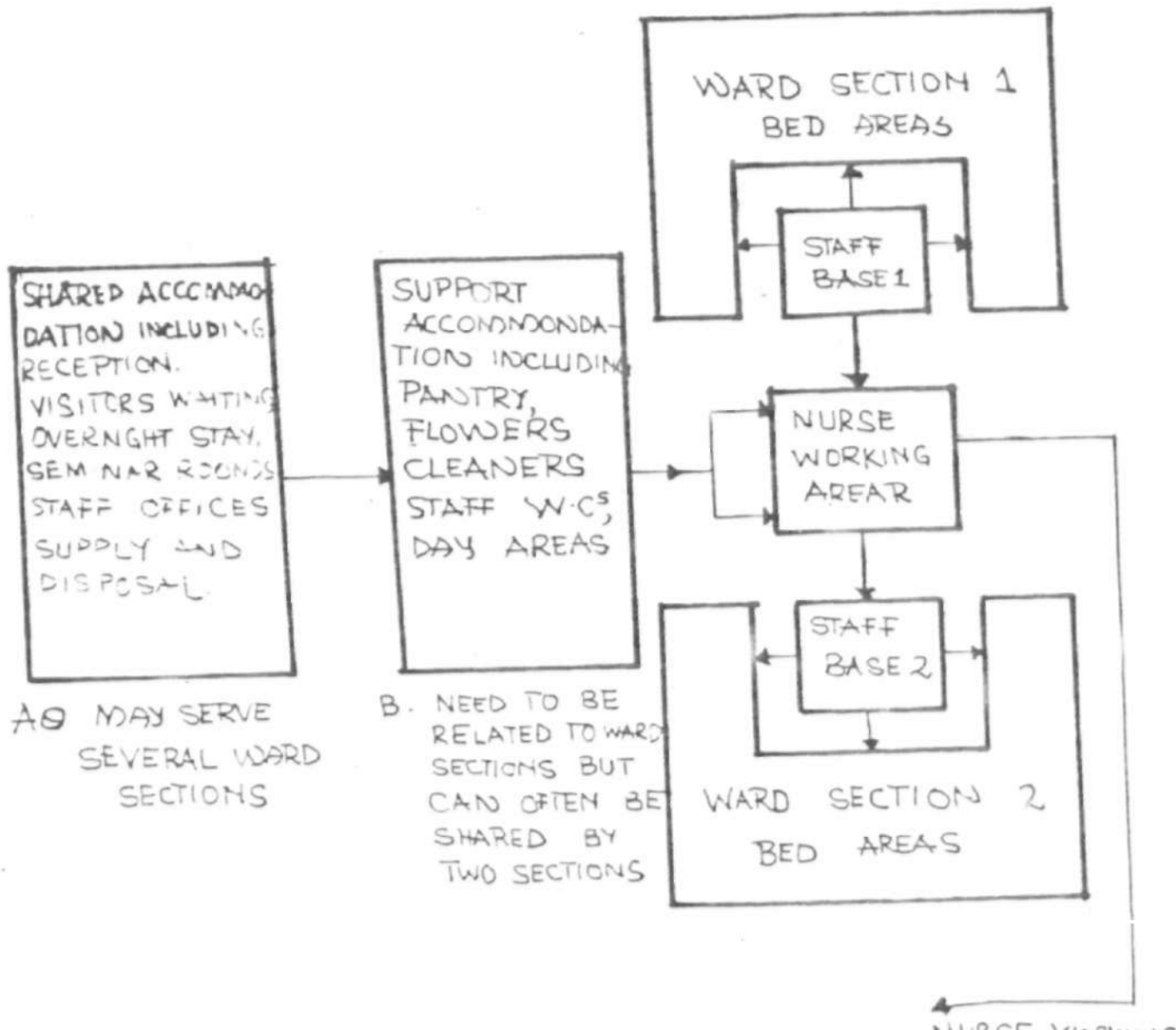


. Lighting system designed for the St. Lô Hospital, plan of ceiling and section through theatre

fig 2·15c Operating theatre light fitting using several low-voltage tungsten bulbs



2·15c . Multi-projector lighting system and observation gallery at the Boucicaut Hospital, Paris; section through a theatre



WARD AREAS

TYPICAL RELATIONSHIP

Fig 2.16

(1) Principles of ward design

a. The number of beds controlled by one ward sister should be between the ranges of 20 to 28.

b. Nurses should be able to observe the greatest possible number of beds from the nursing stations and when carrying out routine duties.

c. Isolation of patients for clinical reasons and for reasons of privacy call for sufficient number of single rooms.

d. Grouping together of nurse work areas and their close relation to bed areas (to avoid long walking distances by staff) is essential.

e. Patients sanitary facilities should be related to groups of bed areas instead of being centralized in one area

(2) Contiguous Wards

If wards units are to be grouped horizotally so that bed areas of adjacent sections are contiguous. There is the possibility of individual sections "expanding" or contracting" at will in response to changes in demand. There are, however, certain factors that will limit this possibility. These include:

(a) The desire of ward sisters to have a stable sphere of influence that they can identify as theirs.

(b) The presence of fire doors at the end of each unit (units are normally designed to be co-terminous with fire sub-compartment and

(c) The nurse call system and other communications being linked to one nursing station or the other.

Two or more units can however be grouped in such a way that there is easy access to facilities which can be shared.

2.45 STERILIZATION UNITS

Central Sterilization Unit

The main functions are sterilization and disinfection of clinic equipment. Items dealth with include dressing packs (with or without instruments) linen e.g (operating gowns) instruments (theatre and ward syringes and bow(s).

Apart from cleaning and sterilizing, the unit also disinfects dental equipment which come into close contact with the patient.

Their servicing and processing units need steam service to autoclaves, and a very good relationship to internal supply routes of the hospital, especially to the operating theatre.

This unit is often sited in the industrial zone because of the heat generated and the need to keep steam mains run as short as possible.

This department also supply and dispose goods

(a) Supply

This unit serves essentially as a store and distrbution centre. It provides spaces for unloading, checking, breaking bulk and scruting for delivery to user departments.

Storage space is needed for only a minimum amount of stock for emergencies the aim being to take most of the supplies directly from the delivery vehicles to the area of use without passing through the distribution centre.

(b) Disposal

This takes care of needs from disposal and reprocessing by all wards and departments. The major categories are:

Reprocessing --- linen --- Soiled, Fauled, Infected } Laundry

- Instruments and --- sterile supply unit-equipment

Disposal --- food - plate waste from wards } Central Kitchen waste disposal units or collection by contractor.

- Waste during preparation } Central Kitchen waste disposal units or collection by contractor.

General waste)— Incinerator/collection by local authority contractor.

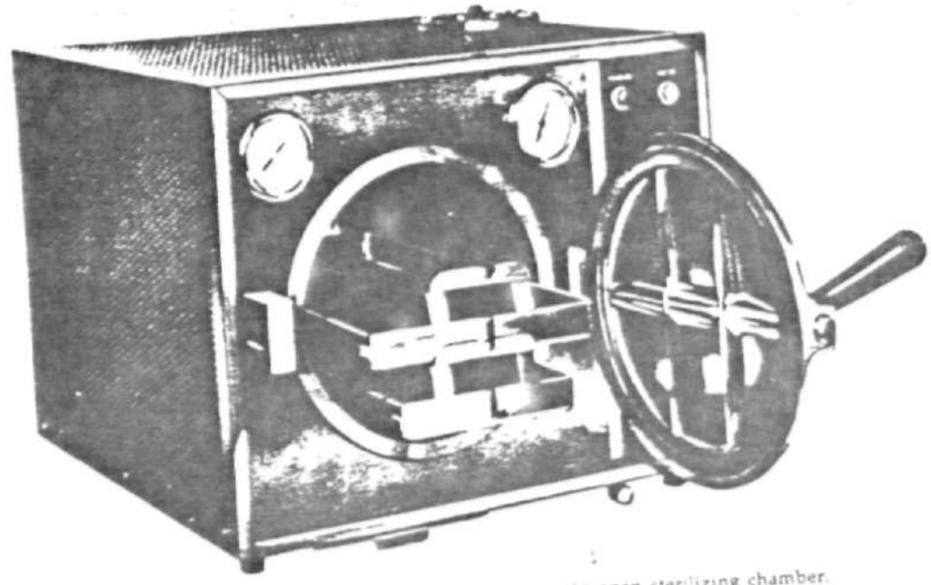
The disposal of some specialized waste e.g. highly infections or radioactive materials need special arrangement some of the equipments used is illustrated in figure 2.17a.

Substerilizing room - There should be one substerilizing unit in each clinic, to provide facilities for instrument cleaning, general and emergency sterilization and storage of sterilized equipments supplied from the central sterilization unit - some of the types of equipment used can be seen in figure 2.17b.

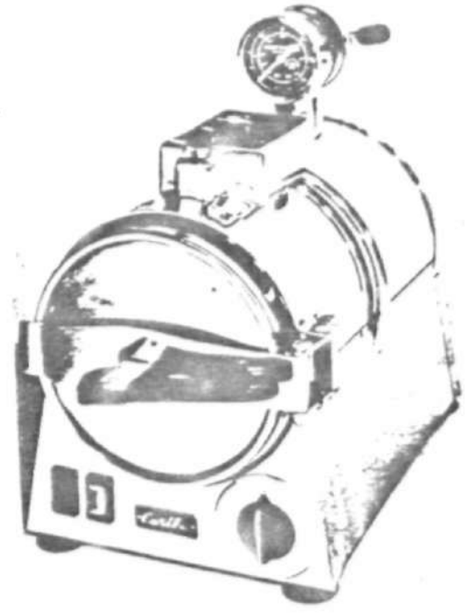
2.50 DEPARTMENT OF PREVENTIVE MEDICINE, SOCIAL DENTISTRY AND PERIODONTOLOGY

Preventive dentistry is concerned with maintenance of a normal masticating mechanism by fortifying the structures of the oral cavity against damage and disease and periodontic is that branch of dentistry delaing with the prevention and treatment of investing and supporting tissues surrounding the root of a tooth. This department is divided into three main units the Academic unit which

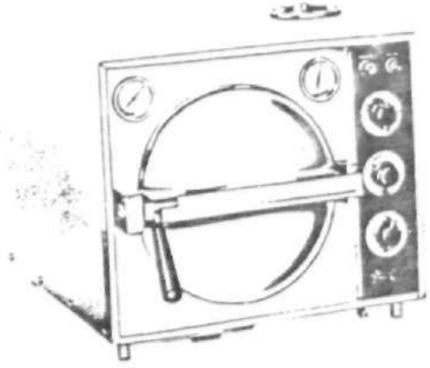
Some of the ... equipment



2.17a An autoclave showing instrument trays in open sterilizing chamber.



An autoclave



An autoclave

Fig 2.17b

takes care of the administration of the department and two clinical units. Periodontology and orthodontic clinic.

2.51 PERIODONTOLOGY CLINIC

This clinic deals mainly with the prevention and treatment of investing and supporting tissues surrounding the root of a tooth that is the gum. The functional areas of this clinic includes waiting area for patients, demonstration room with dental chairs, therapist room and staff room.

The Therapist room is for scaling and polishing scraping of the tartar or dental calculus and the oral hygene instructions. It is here that the cleaning is done once in 6 months or as recommended.

2.52 ORTHODONTIC CLINIC

This is concerned with the diagnosis, causes, prevention and correction of malposed teeth, inproper relationships of the jaws and the resulting disfigurement and malfunction. Although orthodontics is a recognized specialty of dentistry, the general practitioner often treats patients who are developing minor orthodontic problems and who requires preventive or interceptive measures. He also might treat adults who require limited tooth movement as an adjunct to other dental therapy.

The functional areas of this clinic includes demonstration room, laboratory, staff rooms and toilets.

Orthodontics laboratory - Activities in the laboratory varies according to orthodontic technique the dentist employs. However, usually they will include the preparation of impression trays, pouring of impressions, the making of accurate record models, diagnostic set-up pre-selection of pr formed bands and their placement on plaster models, cephalometric tracing, arch wire forming the fabrication of headgear straps

and the polishing of appliances types of cases treated can be seen in (fig. 2.18).

2.60 DEPARTMENT OF CONSERVATION, PROSTHETICS AND PEDODONTIC

This is the busiest department in a dental hospital. The functional requirements of this department includes an Academic Unit and three clinics namely conservative clinic prosthetics and pedodontic clinics.

2.61 CONSERVATIVE CLINIC

Conservation of the teeth is done here in different ways like filling, inlays, pinlays construction of half crown and crowns. The functional requirements of this clinic includes a small waiting area, conservation room with dental chairs, Demonstration room also with dental chairs, conservation technique laboratory , a small radiology unit and staff rooms.

2.62 PROSTHETICS CLINIC

A prosthesis is an artificial substitute for a missing organ or body part. The replacement of one or more missing natural teeth or a part of the oral cavity with an artificial substitute is dental prosthetics. The technique used to reconstruct these missing parts is referred to as prosthodontics.

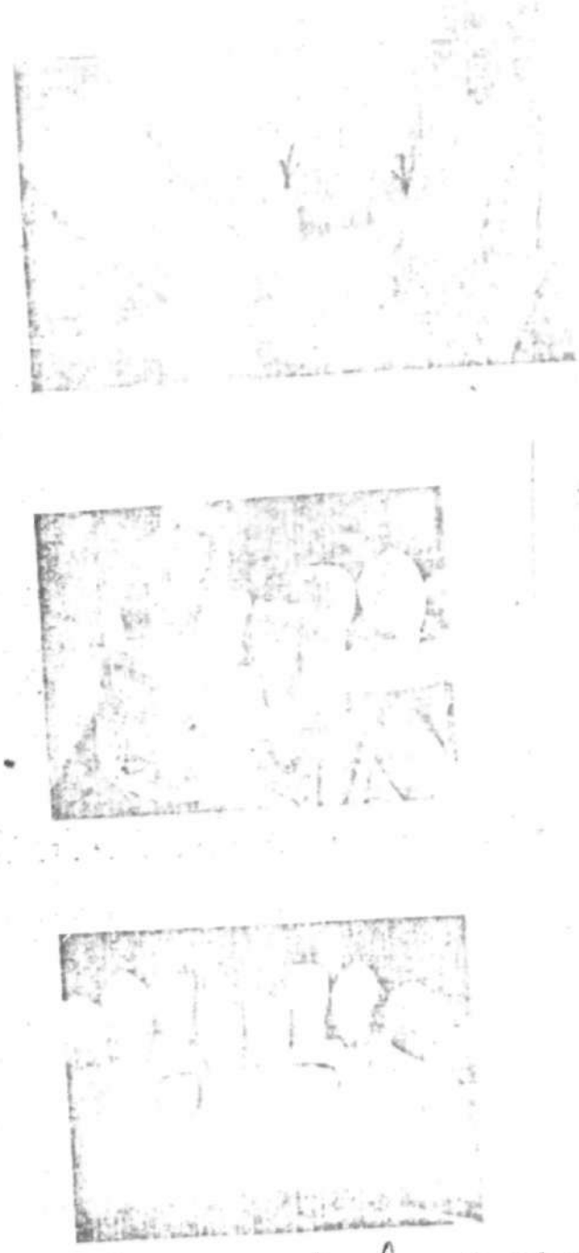
The prompt replacement of even one missing tooth is essential to prevent drifting, rotation or tipping of the adjacent teeth and extrusion of the opposing teeth, as illustrated in (fig. 2.19a)One of the most important purposed of a dental prosthesis is to restore normal contact and occlusion as nearly as possible see (fig 2.19b)

Appliance constructed to replace missing parts may be removable or fixes. A full denture replaces all the missing natural teeth in the dental arch and is removable, when some of natural teeth remaining in the dental arch is

 cases



fig 2.18



Replacement of missing teeth
fig 2.19

used to replace the missing ones. Retention of a full denture depends upon the adaptation of the finished denture to the soft tissues upon which it rest as well as the mental atitude and persistence of the patient, while partial dentures are retained by mechanical devices closely adopted to the remaining teeth.

The functional requirements of a prosthetic clinic to carry out the above requirements include a small waiting area for the patients prosthetics room with cubicles where the impression of the teeth is taken as indicated in figure 2.19b a demonstration room with dental chairs for students demonstration, a material laboratory with a store, Prosthetics teaching laboratory, Polishing, processing and plaster casting room preparation room with store, staff room a seminar room and an academic unit.

Prosthodontics Laboratory: There are some laboratory procedures for example, pouring and trimming models a fabricating crowns and inlays. The different types of equipments used in this laboratory can be seen in figure 2.20.

2.62 PEDODONTIC CLINIC

Pedodontics is the practice of dentistry for children. The pedodontist limits his practice to the care of children, While the general practitioner usually includes children in his practice referring special or unusual cases to a pedodontist.

The functional requirements of the clinic includes, a small waiting area, pedodontics room with dental chairs. Pedodontic laboratory plus one store and rooms for staff.

In the pedodontics laboratory nearly all the

procedures of a general dentistry may be carried out for children. The activities includes boxing of impressions, pouring, separation, trimming and mounting models, cleaning and sterilizing impression trays, making custom trays and bite rims, making space maintainers, repairing dentures, making and mounting dies and wax patterns, investing patterns, casting and polishing inlays and crowns and polishing dentures. Some examples of the cases treated can be seen in figure 2.21.

2.70 DEPARTMENT OF PATHOLOGY AND BIOLOGY

The functional requirements of this department include an academic unit, and two clinical units Pathology and Biology.

2.71 PATHOLOGY

Pathology is the study of the causes of diseases and the changes that a disease produces. It is concerned with investigation of specimens taken from patients, blood, tissure etc. by laboratory techniques for the confirmation or establishment of diagnosis. Clinical division include laboratory staff room and stores. Laboratory work is carried out in self contained sections of large open areas of laboratory bending and smaller spaces of offices etc. common support facilities such as glassures wash up are shared by units.

The major design consideration is the allowance for growth and changes This would indicate ground floor location, possibly in the industrial or service zone. Planning should not inhibit anticipated change in the balance of space between one clinical area and the other. Reallocation of space without much disruption can be effected by grouping large, open laboratory areas



fig 2. 21

together. Services to bench units (water drainage, electricity, piped gases) should not be a hindrance to the rearrangement of individual technicians work space. Services could be provided in a services spine and free standing bench units.

The department is quite heavily engineered. Unpleasant or contaminated air from fume cupboards should not blow in to the direction of the kitchen and theatre departments as these need clean air intake.

2.72 BIOLOGY

The study of the different parts of the body is carried out here. When all parts of the structure and function of the body works in harmony with each other the body is said to be alright but when there is disharmony the body is said to be diseased. The functional requirements of this unit includes a demonstration room, lecture room, exhibition room, store and staff room.

2.80 STUDENT TRAINING UNIT

The student training unit consist of the following:

- lecture rooms
- Seminar rooms
- audio - visual labortary
- Preclinical facilities
- multi-disciplinary teaching and research laboratory
- library
- Student's lodges
- locker rooms

2.81 LECTURE ROOMS

Although they accommodate a minimum of 50 people, all lecture rooms need not to have the same capacity. The smallest should, however, seat at least a full class, plus an over run of 20 percent. If the school expects a later expansion in class size, lecture rooms should be planned from the beginning to accommodate it, and the 20 percent over run allowance should also be based on the larger figure.

A good rule of thumb is to proivide seating capacity for one additional 16-students module beyond class size in schools with 96 ECS. An allowance of 20 sq.ft (1.8 Sq.m) per seat (roughly 200 Sq.ft. (18 Sq.m) for student module of 16), is sufficient to permit an adequate aisle on either side of the seating area and, in a large lecture room, a centre aisle as well.

A minimum of three lecture rooms should be provided, one for use of the basic Science Departments and located near them, one for clinical and preclinical instruction accessible to the clinics, and one for special courses or for multiple use. In the school which will have no auditorium, the multiple-use lecture room might be designed to provide 2½ positions per ECS. All lecture rooms should be located so as to minimize noise and traffic congestion in the corridors.

Layout - It may be difficult to decide whether the lecture room should be long and relatively narrow, like an amphitheatre. Because of it's wide viewing angle, the amphitheatre is not particularly suitable for the showing of slides and films.

On the other hand, instructors favouring the chalk talk technique often dislike a long room. Television monitors can be used in either type.

Every lecture room should be equiped with a large chalkboard, a minimum of 12 lin. ft (3.6 lin.m) is recommended. If because of the size of the room, a raised platform is provided, it should be long enough to extend 2ft (.6m) beyond each end of the chalkboard. Projection screens which can be automatically lowered and raised may also be a part of the permanent equipment.

The floor of lecture rooms should be sloped or terraced slightly to provide a good view of the chalkboards and projection screen, some larger lecture rooms are split level or have a balcony. Whenever possible, students should enter from the rear.

FURNISHINGS. Fixed or movable tablet-arm chairs or auditorium seats equipped with table arms are commonly found in lecture rooms. If the latter are used, the aisle seat at the left of each row can be fitted with an outside table arm for the use of left-handed students. Writing counters with individual seats are also frequently used.

2.82 SEMINAR ROOMS

The seminar room is a place specially planned to accommodate small-group instruction for 16 students or less, usually at an advanced level of training.

In most dental schools, one or more seminar rooms will be needed for the use of each basic Science Department at least one for instruction and perhaps one for departmental conferences.

In the clinical facilities of most schools, each of the special clinics will need one seminar room for treatment planning and consultation, and the general clinic will need more than one. In programming, a reasonable standard for the general clinic would

allow four rooms for a class size of 96, increasing or decreasing the number by one for each 16-student module added or subtracted.

Allow a minimum of 300 sq.ft (~27 sq.m) for each seminar room, with increments of 75sq.ft (6.75sq.m) for every students beyond the 16 accommodated in the standard room.

Seating arrangement in seminar rooms are a students sit around a central table, but some seminar rooms are furnished with standard table-arm chairs. Unitized folding tables and folding chairs permit maximum flexibility in seating arrangements, however, their use is increasing, especially in the seminar room used for showing slides 16mm films, and other visual aids. If it is so used, a small adjoining room used for storage of visual aid materials is also helpful. A seminar, like any other instruction room, should be equipped with a chalkboard.

2.83 AUDIO - VISUAL LABORATORY

The location of the Audio-visual laboratory should be carefully chosen to hold distribution distances to a minimum. A top floor or penthouse would be a logical location. Preferably, the visual aids unit should be nearby. The studio should not be less than 1,300 sq.ft (117 Sq.m) completely visible from the control room. The ceiling height of the studio (13 to 14ft (3.9 - 4.2m) is another factor that must be considered in planning. One area of the studio should contain a dental operatory set-up, with chair, unit and instrument cabinet. A movable (on casters) laboratory demonstration bench will be required for demonstrations of experiments in the basic sciences. The televising of anatomical dis-secting will require a large overhead

mirror. A smaller bench for dental technic demonstration chalk boards. flip stand, and tack boards are additional requirements. Ample maneuvering area for the television cameras and operators must also be provided.

The control room should be elevated and built as close to the ceiling as possible for maximum visibility. Entry into the control room should be possible without going through the studio.

Provision should be made for a film chain installation requiring a room approximately 12 by 15ft(3.6 by 4.5m) Kinescope recorders and[vided] to tape recorders should be planned for in areas adjoining the control room.

The amount of property storage space required will vary with the emphasis placed on television and on the availability of other storage areas.

The director and assistant director will require office areas.

2.84 PRECLINICAL LABORATORY (PHANTOM ROOM)

The preclinical laboratory is designed to accommodate the entire class of freshman or sophomore students in a single session.

Though it is not often so-called, the preclinical laboratory is actually a multidiscipline laboratory for all the preclinical dental science courses are taught here, the instructors of the several subjects take over the laboratory in turn while the students remain in their assigned places.

Phantom units are required for a preclinical phantom course in restorative dentistry and conservative dentistry. One phantom unit must be made available for each freshmen. The drawing in (figure 2.22) shows the conventional type, with the phantom head fastened to the table. This arrangement will be expedient if the

Phantom table

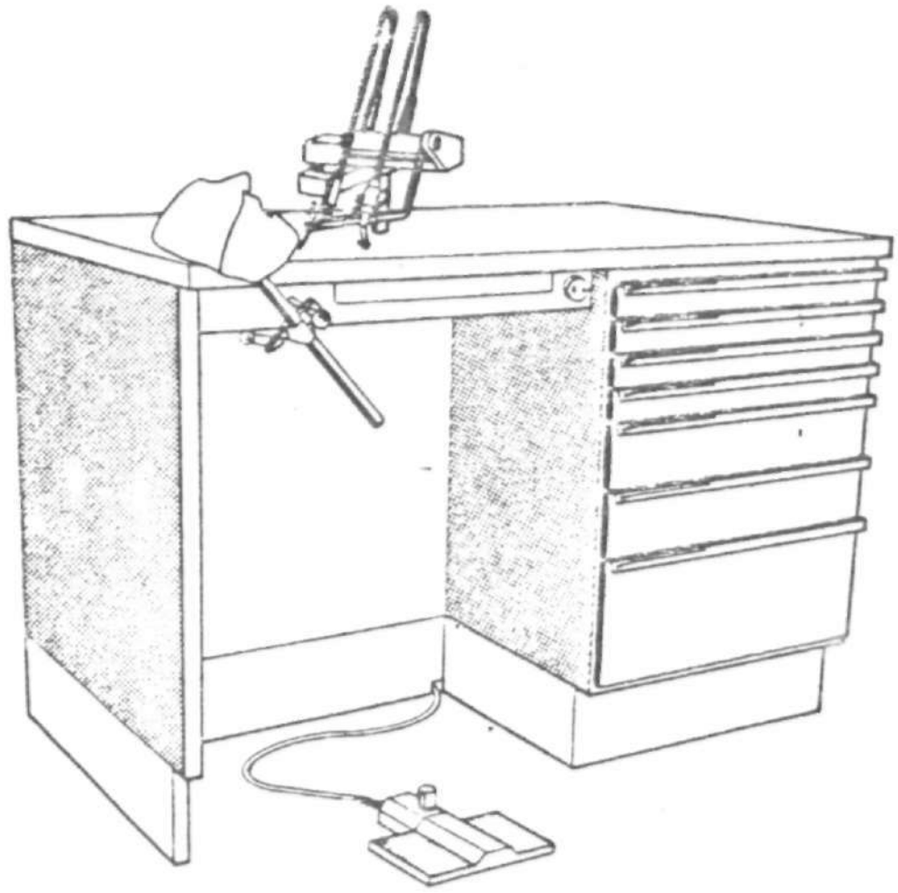


Fig 2.22

area available is insufficient for the arrangement of individual phantom units.

The arrangement of individual units as shown in figure 2.23 allows treatment similar to practical conditions, i.e, in contrast to the usual phantom laboratory benches, this unit allows to simulate all treatment methods generally practised in dental chairs. Seating In the arrangement most common to preclinical laboratories students sit on each side of a bench, their backs to those of students at the next row of benches. The aisles separating the rows are at least 4ft 6in (1.35m) wide, so that the instructor may move easily between the benches as he inspects the students work.

In some of the newer laboratories, benches are arranged so that all students face in one direction usually toward the instructor's podium. The aisles between benches (which is 3ft (.9m) minimum,is satisfactory) are not as wide as those required for back to back seating. On the other hand , back-to-back seating is economical. It conserves floor space and reduces the cost of bench work and utilities.

In either of the two seating plans, high or low benches can be used, but the low bench 32in (.75m) in height will perhaps be the more satisfactory, with low benches, a standard adjustable typing chair or casters can be used and is less costly than the laboratory stool. All benches should be equipped with gas, air and duplex electrical receptacles. Each student station at the bench should be at least 3ft (0.9m) wide and 3ft 6in (1.05m) is actually more satisfactory. If the latter figure is used, an over-all allowance of 38 sq.ft (3.42 sq.m) per student position will provide adequately for the teaching facilities.

Every preclinical technic laboratory should provide the instructor with a table or desk, equipped with gas,

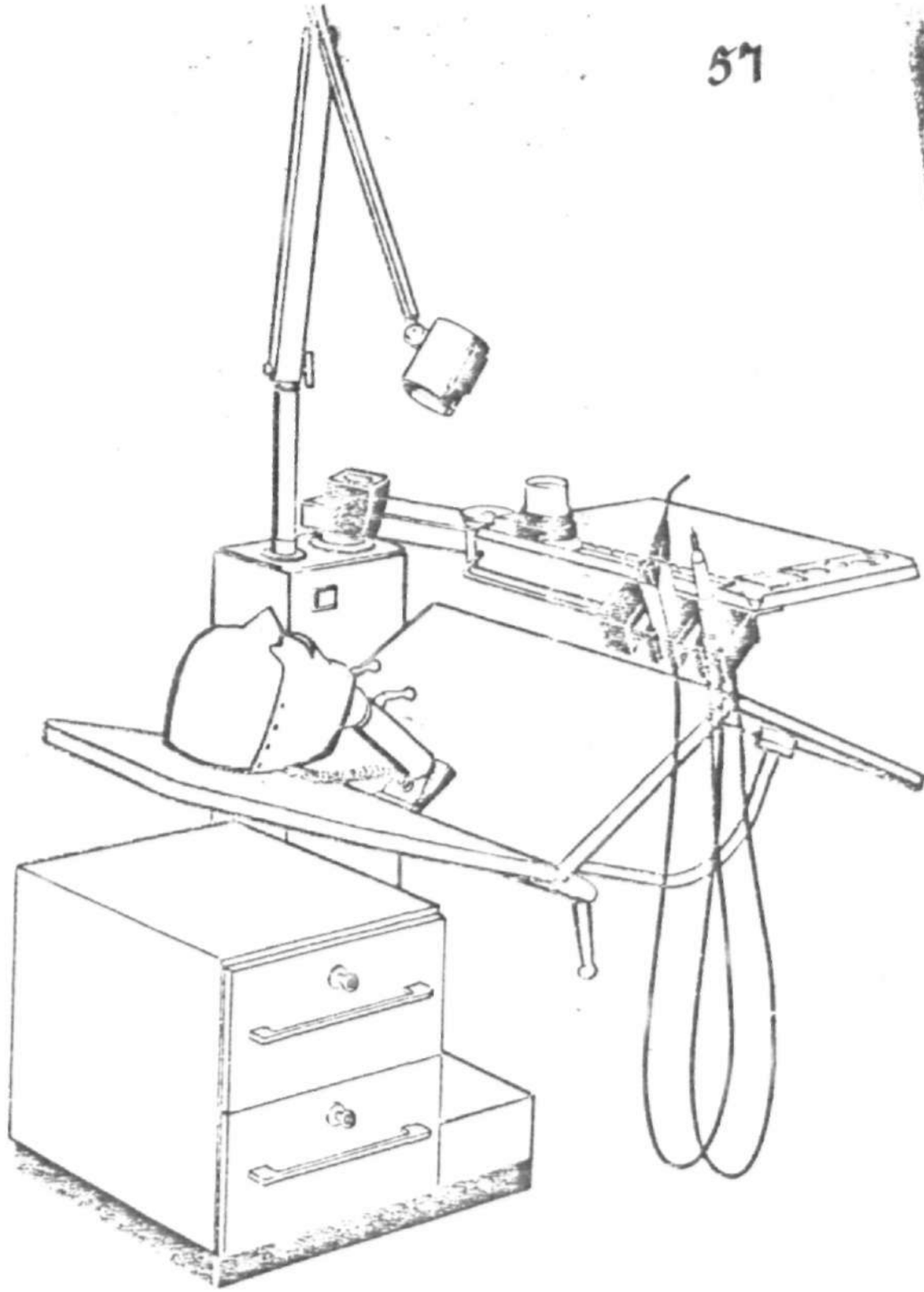


Fig. 2.23

PHANTOMUNIT

air and electricity for demonstration purposes. In large classes which require more than one instructor, each should be allotted desk space.

Ancillary facilities To reduce the tracking of plaster from the laboratory into the public corridors, the processing room, is used for pouring wax forms, moulds, impressions and flasks for denture technic laboratory. Also nearby should be a small store-room. Some of the laboratory equipments can be seen in (fig. 2.24).

2.85 LIBRARY

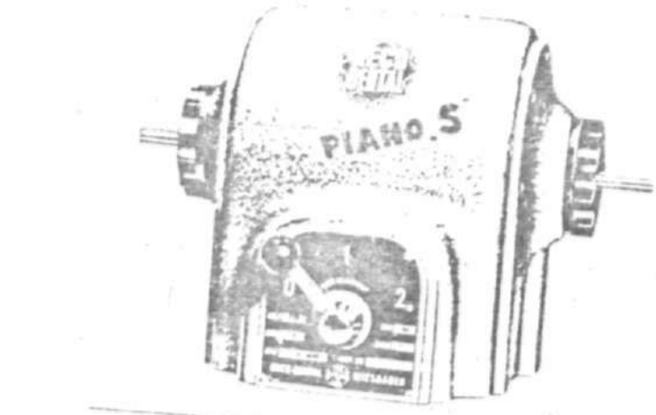
Reading and Study rooms: The main reading room should accommodate from 25 to 50 percent of the total number of students. Reading room exits should be controlled by book charge-out or loan desks and the card catalogue and circulation desk should be nearby.

Carrels. Unenclosed desk areas of about 12sq.ft (1.08sq.m) are useful for individual study and should be available in the ratio of one for every 10 students. Small study rooms reserved for graduate and post-doctoral students are also an advantage. Either they should be sound proofed or located far enough away from the main reading room to permit students to use typewriters without disturbing others.

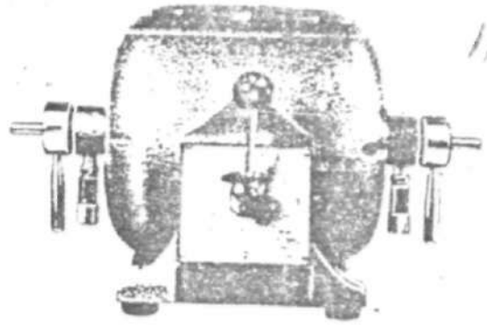
Microfilm Anxilliary facilities such as a microfilm reading room, a sound tape room and a rare book room are also desirable.

Stacks. Stacks should be arranged to facilitate both storage and use of books. The stacks should be located as close to reading rooms as possible.

Stack area varies in proportion to volumes. Generous allowances should always be made for future expansion stack sections are usually 3ft (.9m) in length and 7ft 6in (2.25m) in height, with a shelf







Some laboratory equipments

Fig 2.24

dept of at least 10in (.25m) one single faced section 3ft (.9m) long will accommodate approximately 100 volumes. Service aisles between stacks should be at least 3ft(.9m) wide, and the main aisles at least 3ft 8in (1.1m) wide. A microfilm room for processing and storage may be associated with the stack area.

Other facilities Acquisition and catalogue rooms should be near the public card catalogue and have direct access to the stacks.

Office should be provided for the head Librarian and an assistant, with the head Librarian's office accessible both to staff rooms and to readers, storage space for office supplies should be available.

2.86 STUDENT LOUNGES

The student lounge is important; perhaps indispensable to a dental school, and the availability of similar facilities elsewhere on the campus does not, in this case reduce the need for a lounge in the dental school itself, the lounge is the students social centre.

Although the number of women enrolled in undergraduate dental schools is small, schools should provide separate lounges for their conveniences. In some schools, women dental students will be able to share the lounges provided for student dental hygienists and dental assistants.

In programming, the Committee should estimate lounge space at 23sq ft (2.07sq.m) per ECS. For classes of different sizes 200 sq.ft (18 sq.m) should be added or subtracted for each group of 16 students. These amounts permit simultaneous occupancy by approximately 25 percent of the total enrollment.

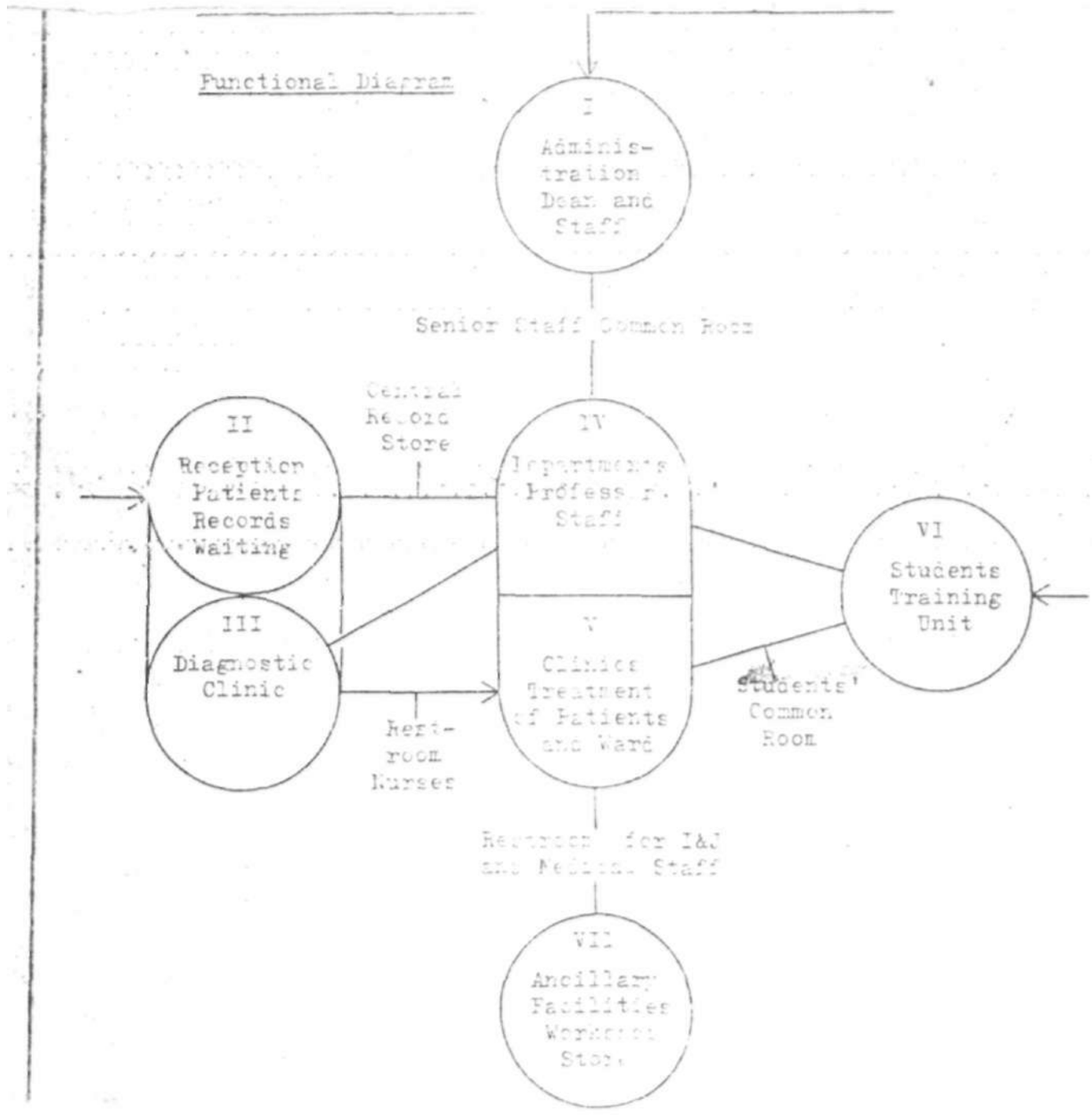
2.87 LOCKER ROOMS

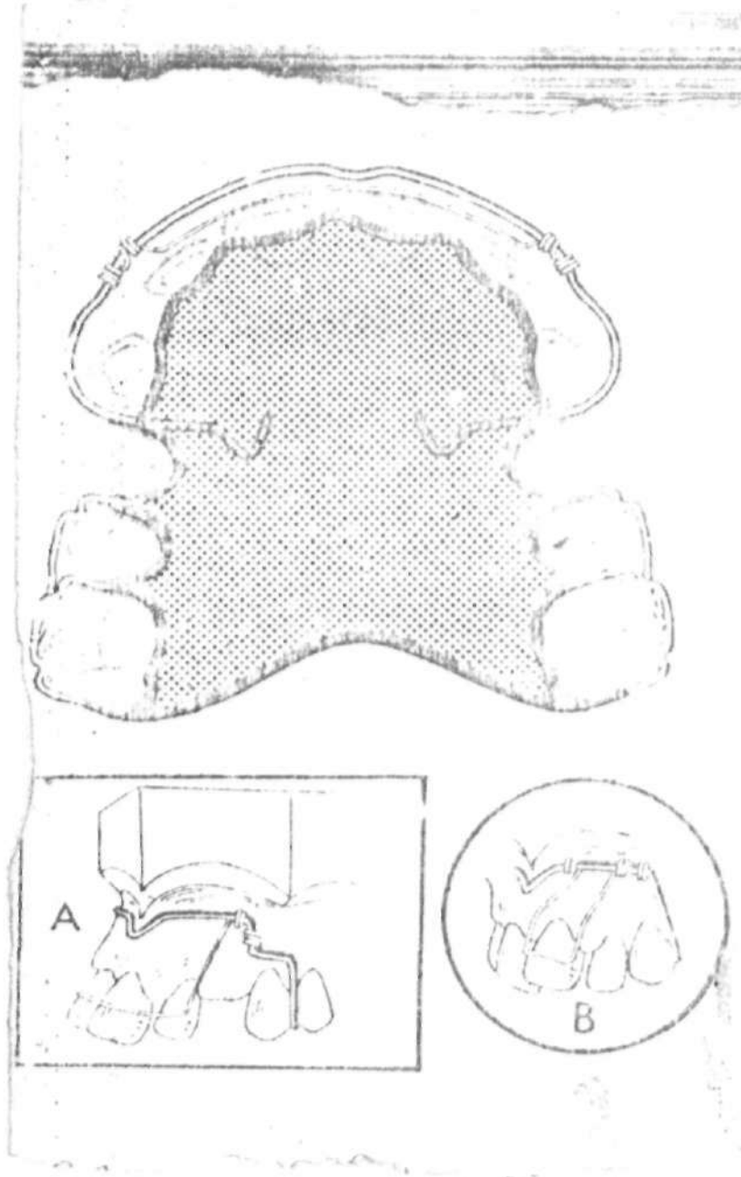
Adjoining the lounge areas should be adequate toilet facilities and if feasible the student locker rooms. Locker rooms should at least be convenient to

the part of the school where the student spends most of his academic day, near the basic science and preclinical technic laboratories for freshmen and sophomores, near the clinics and associated clinical laboratories for juniors and seniors.

The locker room area required for male students can be estimated at 1,800 sq.ft (162 sq.m) for an entering class of 48 (or three 16-student modules) this amount should be increased by 500 sq.ft (45 sq.m) for each additional group of 16 students.

As to the lockers themselves, the types chosen should depend on the use to which they are put. If dental students are expected to keep their instrument cases in clothing lockers, the size of the case should be established and a prototype made so that the suitability of the lockers can be tested before they are purchased. The lockers chosen should also be large enough to accommodate other dental equipment.


Functional Diagram
I
Administration
Dean and Staff
Senior Staff Common Room
II
Reception
Patients
Records
Waiting
III
Diagnostic
Clinic
Central
Records
Store
IV
Departments
Professional
Staff
V
Clinics
Treatment
of Patients
and Ward
VI
Students
Training
Unit
Students'
Common
Room
Ward-
room
Nurses
VII
Ancillary
Facilities
Workers
Store



Aron Spring

Fig 2.25

CHAPTER III

CLINICS

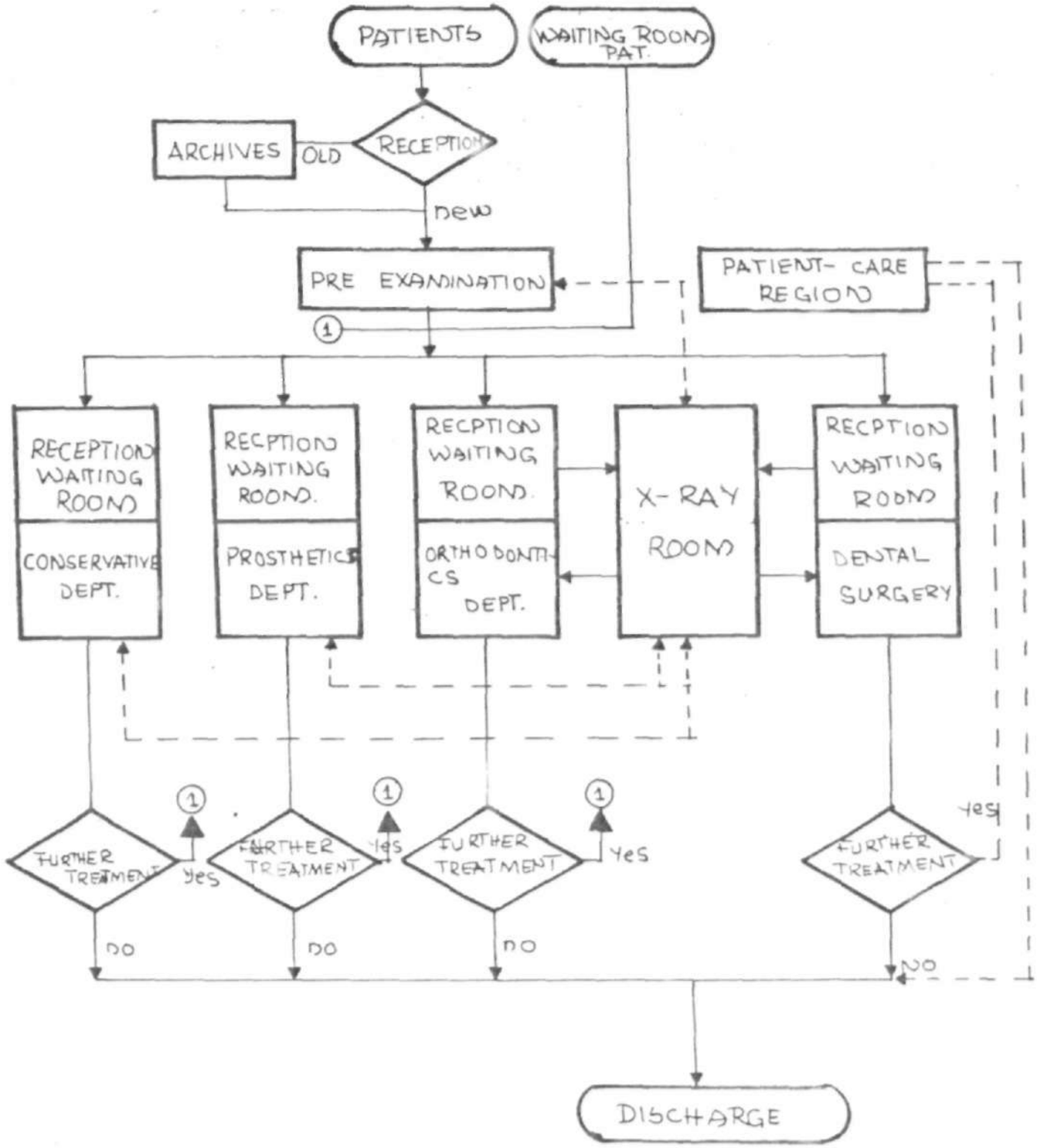
A clinic is a place for medical examination, advice or treatment. In the clinics, dental students gain experience in the correction and control of dental diseases and disorders. Here too, the community finds an additional source of dental services, some of which are frequently unobtainable outside the dental school.

3.10 PATIENT MOVEMENT IN THE CLINICS

Figure 3.1 illustrate patient movement through the clinics. The new patient first reports to the information desk which should be located in the clinic area. He then proceeds to the registration desk, where a case record will be opened for him. At the appointment desk, his next stop, he is scheduled for an oral examination.

The patient then undergoes, either on the initial visit or a subsequent one, a screening examination in the diagnostic clinic, this procedure enables the school to select patient with varied dental problems and send them to the necessary department.

Following the screening examination, the patient goes to the radiology department for full-mouth X-ray if need be. When the examination is completed, the patient returns to the appointment desk where he is referred for subsequent visits, or to one of the special clinics. On later visits the patient reports directly to the waiting room of the clinic where he is to receive treatment.



PATIENT AND INFORMATION FLOW PLAN

Fig 3.1

3.20 SPACE ALLOCATION OF DENTAL TREATMENT BOOTHS

Dental educators prefer the adoption of cubicle in their clinics. The privacy of the cubicle is a factor appreciated by patients, as well as students and the overall atmosphere of the cubicle. It engender self-confidence and efficiency on the part of the students. It also favour traffic patterns of the Medical staff and patients, and allows separate sinks and stationary instrument cabinets to be accommodated for each operator so that the observance of hygene is easy. See fig. 3.2(a).

Occasionally, it is necessary for reason of space, to accommodate a much larger number of dental units in a given area. This is possible only by omitting the partitions and by decreasing the centre to centre distance to say two metres. However, this entails clear disadvantages, such as an unfavourrable traffic pattern both for the patients and the personnel. Sinks can be fitted only in group at central points so that the observance of hygenic aspect is rendered difficult, and only one mobile instrument cabinet can be installed per dental unit, therefore this solution should be chosen only in cases of necessity. This is illustrated in (fig. 3.2 , 3.7 to 3.11).

Cubicles accommodating the student-assistant-team must be narrower and deeper than those in which a student works alone. The basic equipments with dimensions needed in a treatment booth, is shown in (fig.3.3 and 3.6). Dimensions of treatment booths varies depending on the department and equipment in different departments. The dimensions are determined by the activities and equipment needed in each department.

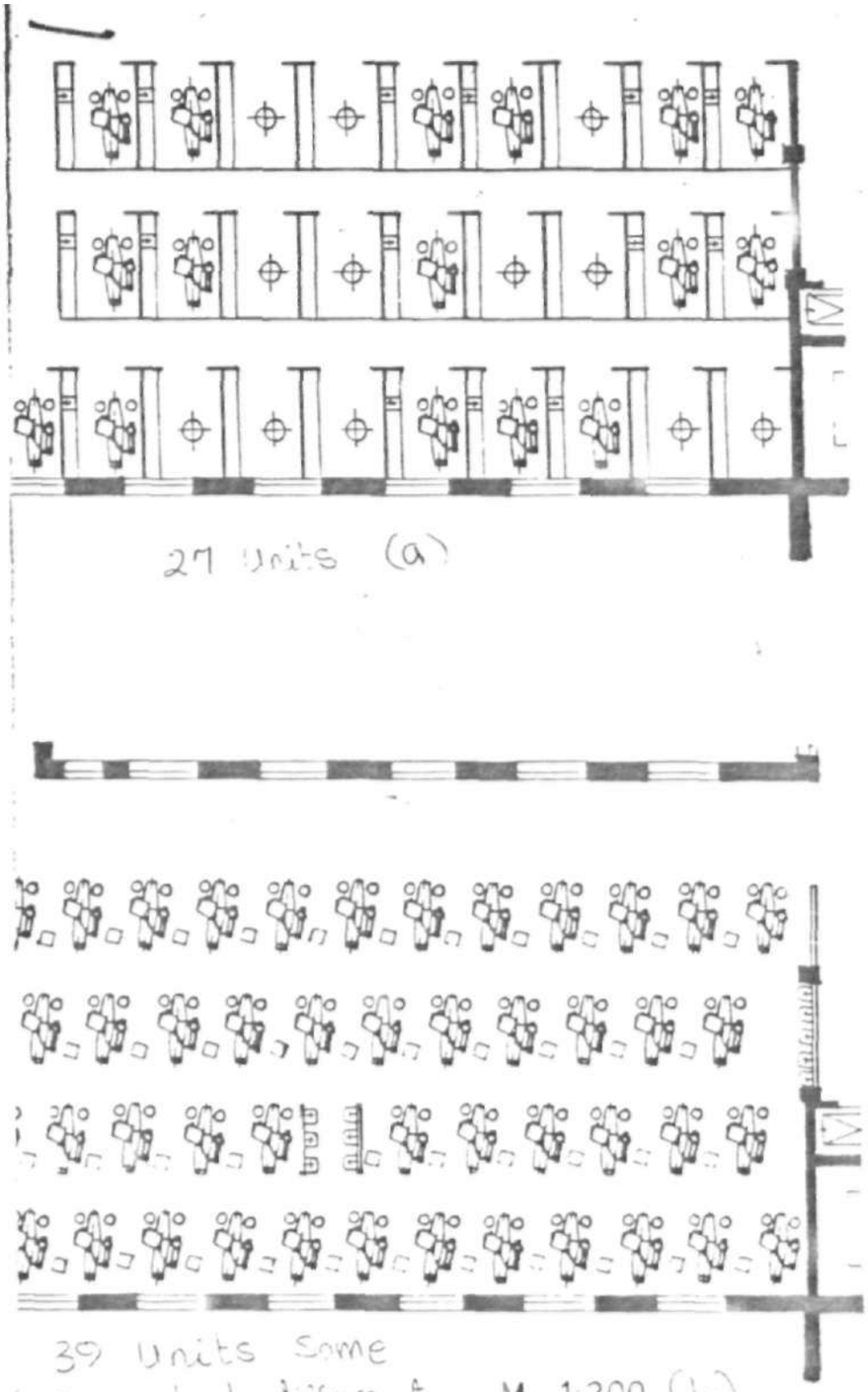
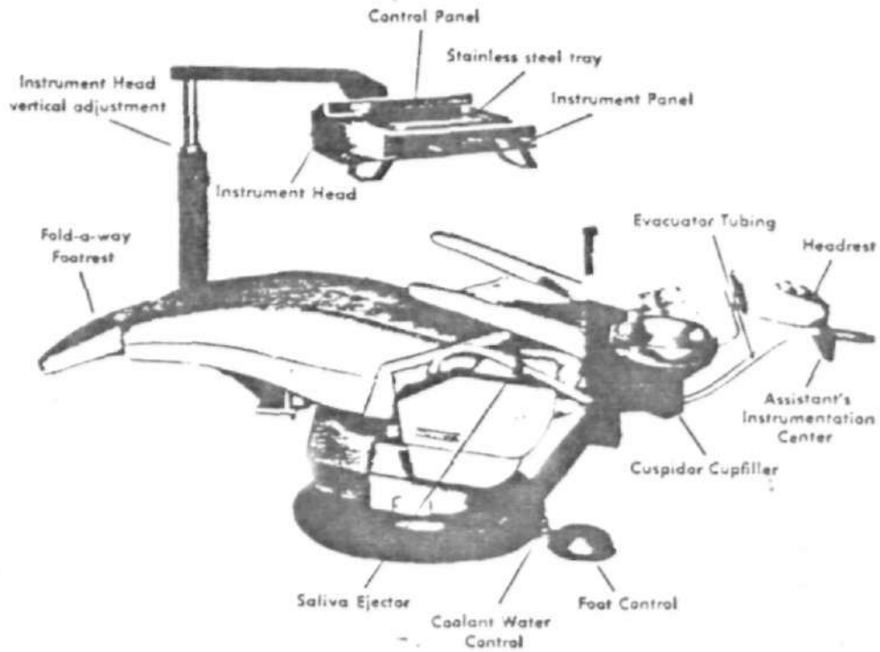


Fig. 3.2

Example of space requirements
for cubicle arrangement

Treatment booth equipments



A chair-mounted dental unit. The compact, one-piece design provides convenient working areas for both the dentist and the dental assistant.

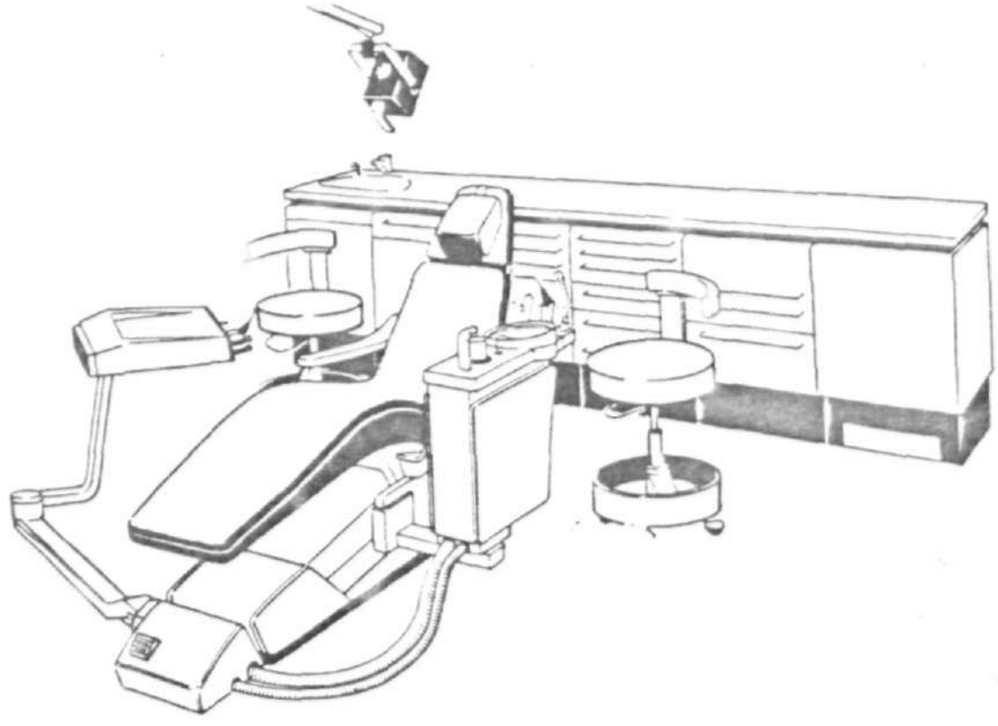
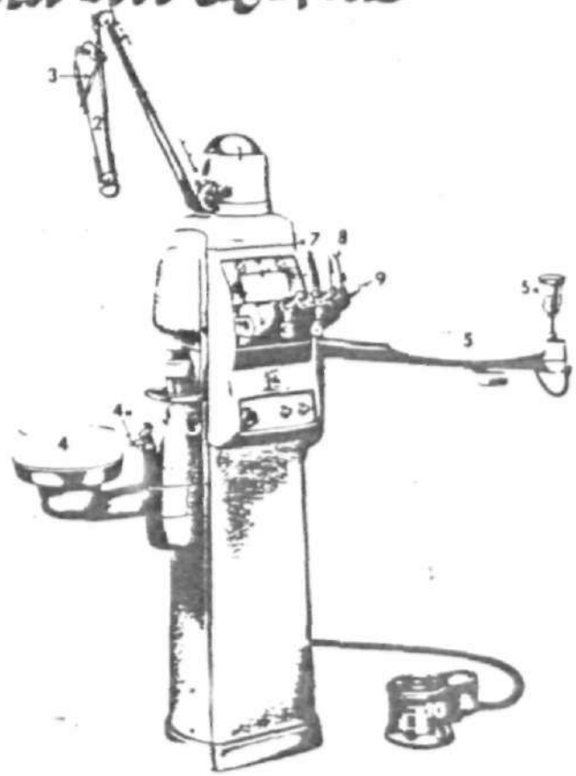


Fig. 3.3

Treatment Room Equipments



The dental unit. (1) Dome covering dental engine. (2) Engine arm. (3) Handpiece. (4) Cuspidor. (4a) Cuspidor controls. (5) Bracket table. (5a) Attached Bunsen burner. (6) Air syringe. (7) Water syringe. (8) Spray syringe. (9) Pulp vitality tester. (10) Foot controller. (Saliva ejector mouthpiece can be seen immediately to the right of the cuspidor controls.) (The Ritter Co., Inc.)



Dental assistant's stool is higher than operator's stool. Foot ring and body rest help to maintain proper posture. Body rest can support the back or the abdomen. (Ritter Sybron Corp.)

Fig 3·4

The most important measurements.

10

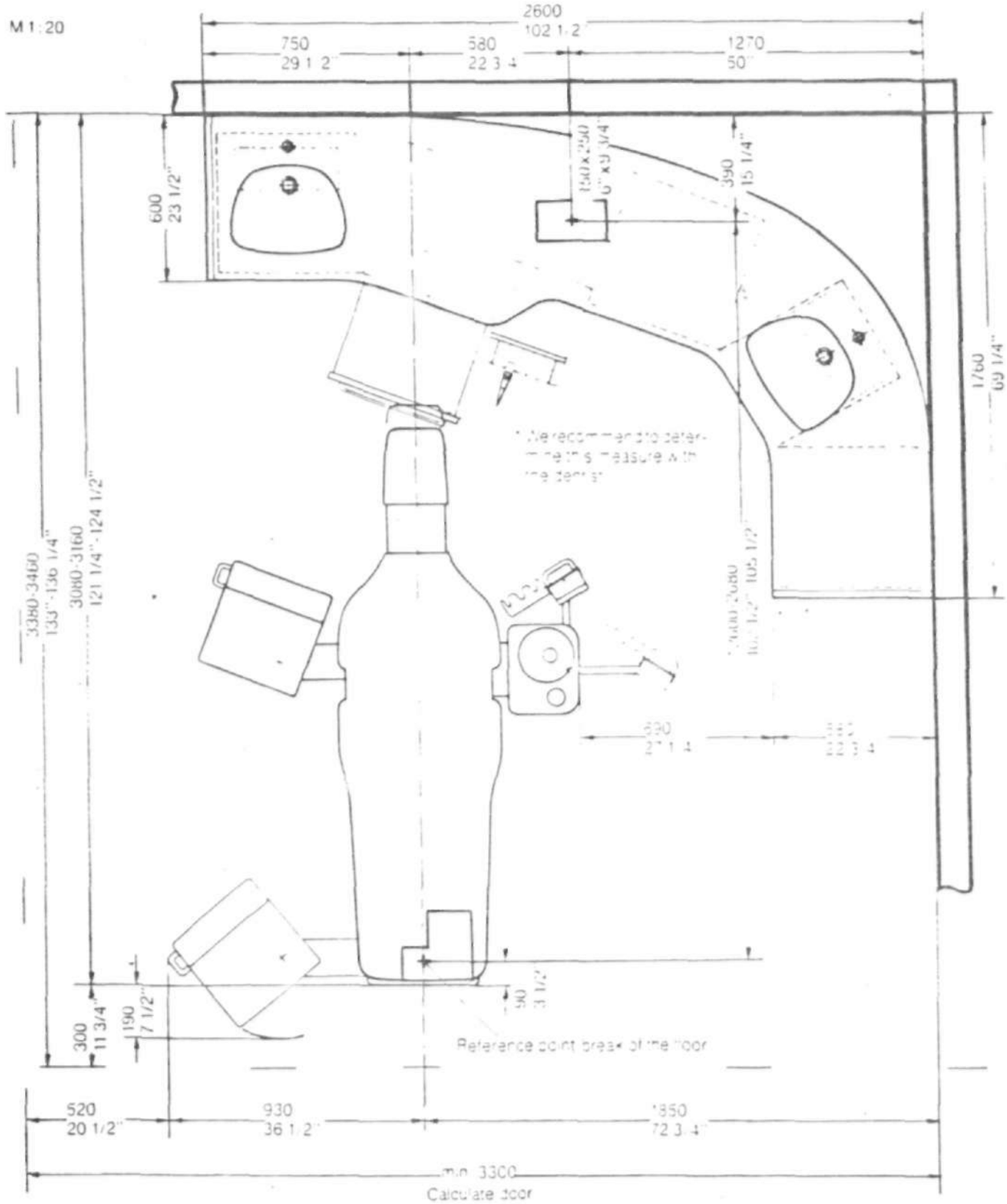
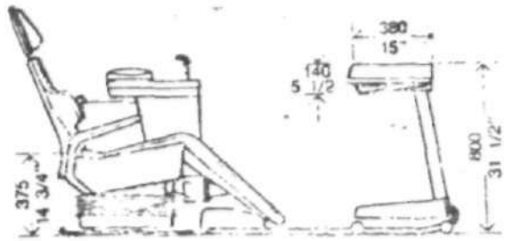
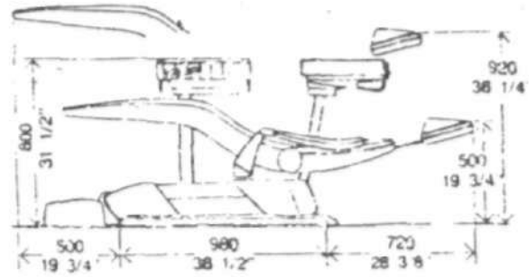
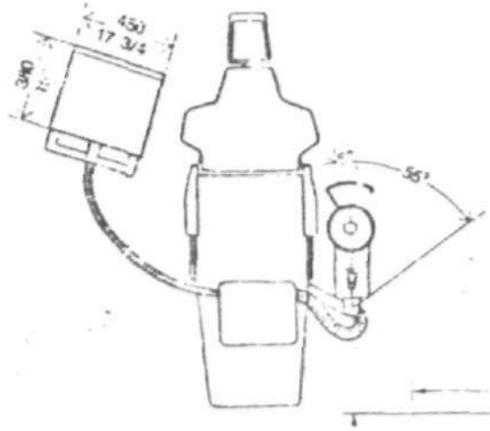
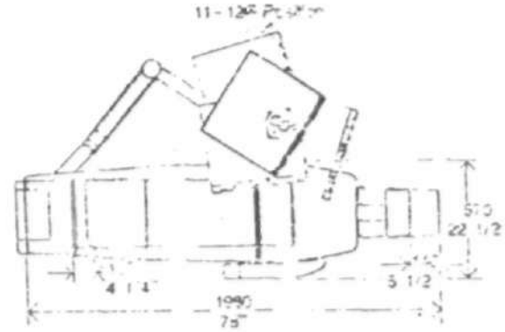


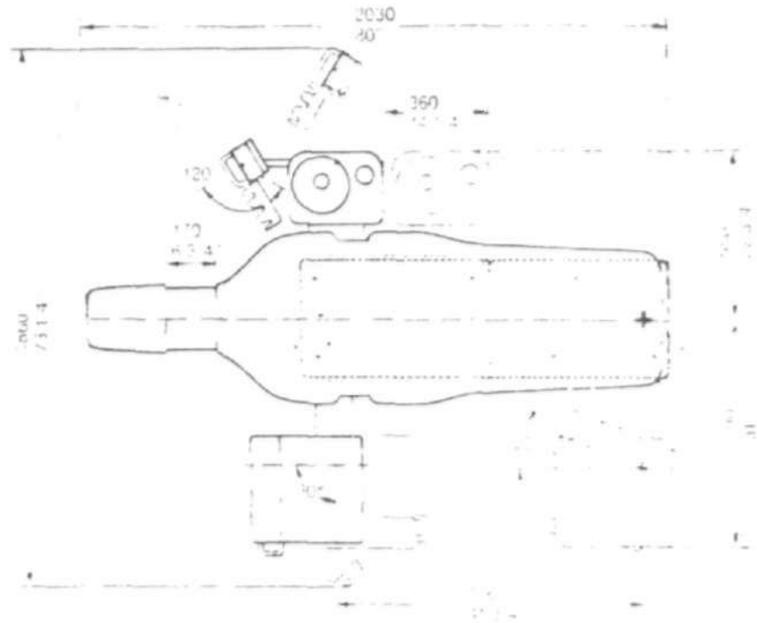
Fig 3.5



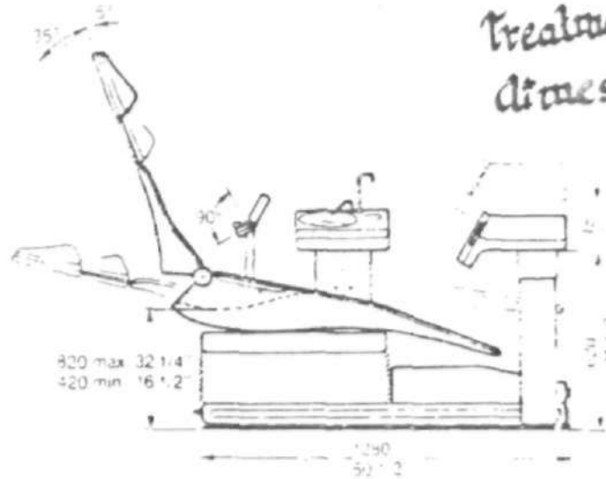


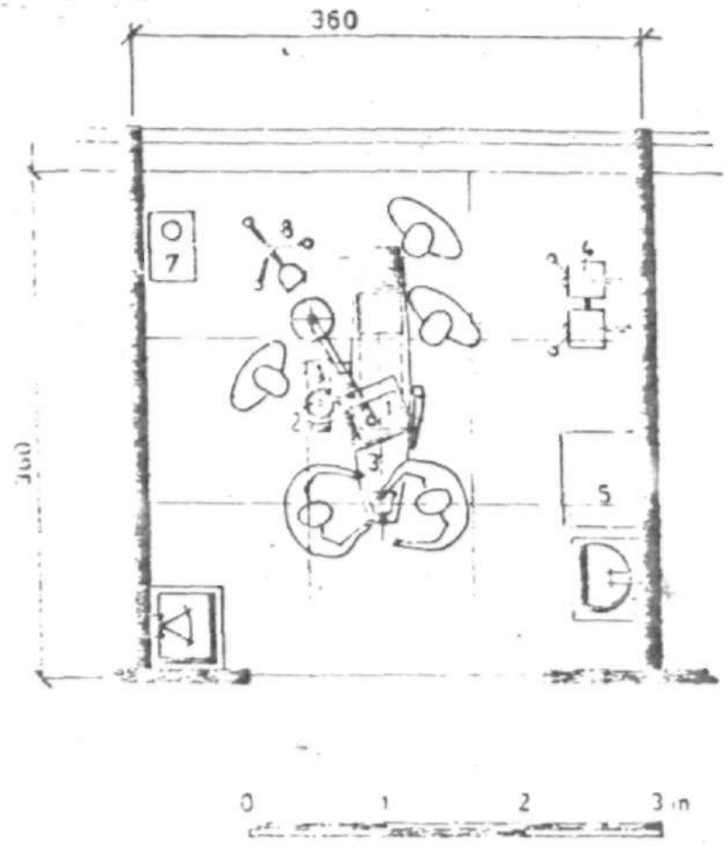






Treatment chair's dimensions Fig. 36



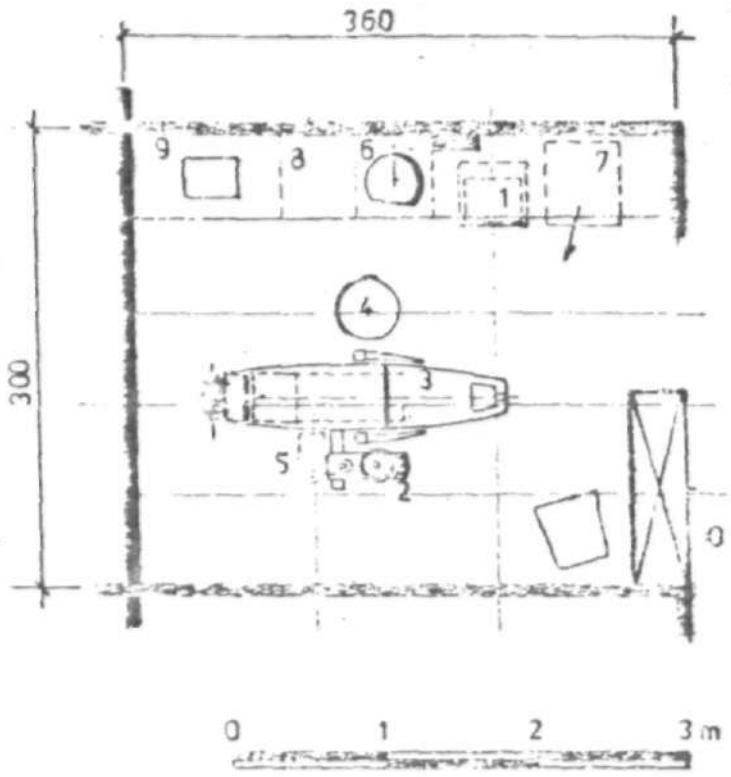


1 SIROSONT unit, ceiling mounting
2 Motor unit SIRO 1, chair-mounting
3 Dental chair SL 2
4 Drum stand
5 Instrument handing table
6 Wash-basin cabinet
7 Evacuator for surgery with valve cone
8 Operating light, mobile

Example for treatment booth

Surgical department

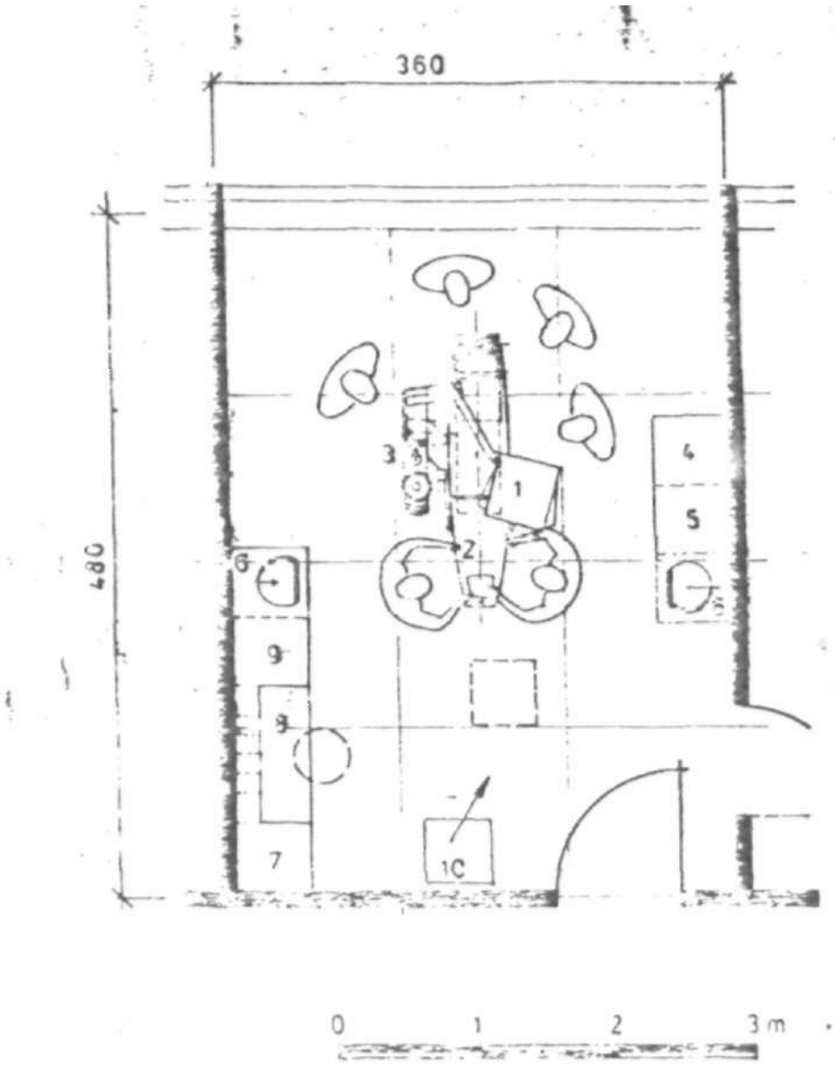
Fig 3.7



1 SIROCNT unit, mobile
2 Water unit SIRO 1
3 Dental chair SL 2
4 SIRONA working chair
5 Operating light
6 Wash-basin cabinet
7 Instrument cabinet, mobile
8 Instrument cabinet with Laboratory dental engine
9 Attachment plate with film viewing box
10 Model cabinets

— Example of treatment booth

Fig 3·8

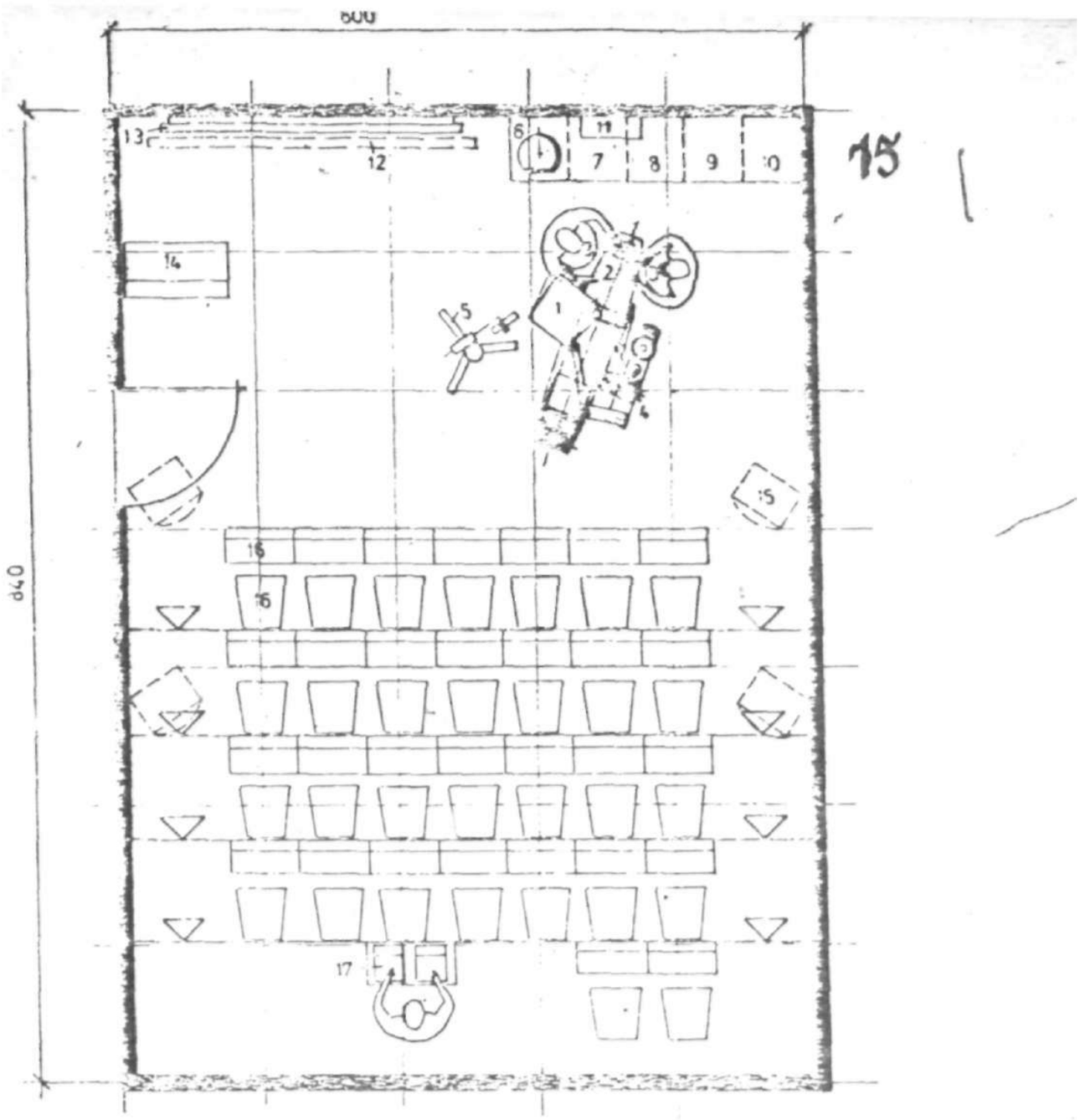


1 SIROFLEX, chairmounting
2 Dental chair SL 2
3 Operating light
4 Instrument cabinet
5 Instrument cabinet
6 Wash-basin cabinet
7 Material cabinet
8 Writing-table
9 Instrument cabinet
10 Instrument cabinet, mobile

Example of treatment room

for lecturer

Fig 3.9



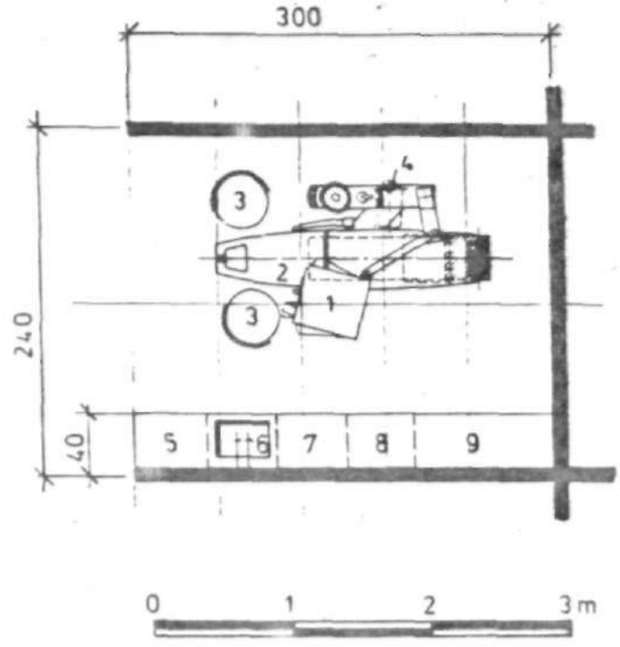
15

Example of a demonstration room

(for 30 students)

1 SIROFLEX, chairmounting
2 Dental chair SL 2
3 SIRONA working chair
4 Operating light
5 TV - camera
6 Sink unit, FUNCTION 3000
7 Dentist's unit, FUNCTION 3000
8 Assistant's unit, FUNCTION 3000
9 Mixing unit, FUNCTION 3000
10 Standard cabinet, FUNCTION 3000
11 X-ray film viewer
12 Projection screen (ceiling mounted)
13 Demonstration - black board
14 Speaker's desk
15 Monitor
16 Chair with writing plate (retractable)
17 Slide projector

Fig 3.10



1 SIROFLEX, chairmounting
2 Dental chair SL 2
3 SIRONA working chair
4 Operating light
5 Instrument cabinet
6 Wash-basin cabinet
7 Instrument cabinet
8 Material cabinet
9 Attachment plate

Fig. 8-11

Example of treatment booth

Conservative and prosthetic dept.

Cubicles may be either partially or fully enclosed. A partition height of approximately 1.5m (5ft) is recommended for most cubicles. This provided privacy, yet allow for supervision and gives an impression of spaciousness. A 1.2m (4ft) partition topped by a 30cm (1ft) high translucent plastic panel may be used allowing an open space between partition and floor facilities cleaning. However, one or two fully enclosed cubicles are desirable in every clinic.

The treatment areas assigned to Senior dental surgeons and professors as well as the treatment rooms for handecapped patients should be accommodated in rooms enclosed by high partitions. In such cases cabinets must be provided on both sides for the dentist and his assistant.

3.30 SERVICE INSTALLATIONS IN A DENTAL HOSPITAL

In order that treatment booths and technical laboratory in a dental clinic can be operated, besides the general power supplies above all a great number of sanitary service connections are necessary, as for example, water supply and drainage, compressed air, central aspirator and town gas beyond this, in a number of rooms, oxygen and nitrous oxide must be available. Since the pipes to the treatment booth must be routed in parts together with the usual supply media for heating and ventilation, an optimum layout is often only possible by planing before hand.

The best solution for all installation work is to include an accessible service storey in the planning which allows a clearly seen distribution of services, as well as providing the possibility of sitting aspirator machines close to the work stations and accommodation for processing installation, transformers etc. This is however, often considered unacceptable on the grouds of higher building costs.

As a rule therefore the installation supply routes are contained within a suspended ceilling. The supply pipes etc. must subsequently be readily accessible through removable panels and plates etc. The necessary shut-off valves for water supply compressed air and gas to a group units or work benches should not be accommodated in the suspended ceiling, but in the storey in which the units are sited and in an easily accessible and visible position.

The cross-sectional area of the main and distribution lines depends on the type of units and the number of connections and in the case of suction lines, on the pipe length and can thus only be established by taking exact data into consideration.

In order to avoid having to put a large number of treatment booths out of action during service work, if possible only 2 or maximum of 3 units should be connected to one supply circuit. When carrying out electrical installation work, the regulations for the installation of electrical equipment in rooms for medical purposes must be observed.

3.31 COMPRESSED AIR SUPPLY

For the compressed air supply to dental units and all laboratory work stations, the installation of from 2 - 4 compressors with separate pressure vessels is to be recommended. The individual compressors are interconnected and can work alterhatively, one or two installations would cover normal requirements the additional units switching is to meet peak demands.

An inputs pressure of at least 4.5 bar (maximum 7 bar) must be available at the treatment stations and in the laboratory at the blowing-out pistols three bar and

at the sand-blasting units 7 bar.

The compressor air machine can be seen in figure

3.32 EMERGENCY ELECTRICAL SUPPLY

The general emergency electrical supply in a dental hospital must come into operation within 15 seconds of a mains power failure. The following rooms or units should be connected to an emergency electrical supply.

(a) All operating theatres;
(b) All the treatment stations in the surgical out patients department including emergency treatment;
(c) All lifts if any, as well as emergency lighting;
(d) At least one unit in the central sterilizations;
(e) Rapid sterilization in the individual departments;
(f) The medical gas supply in so far as it is dependent on power line supply,
(g) At least one work station for emergency treatments including the aspirator appertaining;
(h) At least one compressed air installation;
(i) Resuscitation units.

The special emergency electrical supply is above all intended for operational installations intensive care stations and intensive monitoring stations. At each operating station or comparable surgical station, at least one operating light must be immediately available and continue to be available for at least 3 hours. The switch over time should amount to 0.5 seconds at the most.

3.33 WATER QUALITY FOR DENTAL UNITS

In so far the water hardness is below $6^{o}dH_4$ no special measures are required. In the case of water up to $16^{o}dH$, a water softening plant is to be recommended. Above $16^{o}dH_4$ an ion exchange installation is urgently required. dH_4 10mg CAO/litre.

When using copper zinc pipes, it is necessary to attach an alkali sluice to the ion exchanger.

4.34 VENTILATION

The ventilation system adopted in the design of a building plays a very important role. There are three ventilation system possible in a dental school.

(a) Complete artificial ventilation
(b) Complete natural ventilation
(c) Combination of natural and artificial ventilation.

Total dependence on artificial ventilation imposes some constraints on the dental school, particularly when sophisticated equipment break down. On the other hand, total dependence on natural ventilation poses some problems in maintenance of asepsis in some operating theatre suite. This would require air conditioning to control the temperature below or above ambient temperature, as well as humidity and sterile filtration of the air, which is, impossible with natural ventilation. In most dental school therefore, a balance is truck between those departments that of necessity must use air condition, and those in which it is not essential.

Complete air conditioning though, has some advantages, it increases the ratio of internal space to external walls, thus making possible a compact building form that would

otherwise be impossible. The compactness of the building form logically leads to a reduction in site areas occupied by the school, and hence economy in the cost of the building fabric. However, this economy is checked by the high demands on artificial lighting and other services needed to maintain such a building.

Natural ventilation on the other hand, imposes great contraints on the plan shape possible. It leads to a high ratio of external wall to floor area. This means high cost of building fabric, though services and running costs are reduced.

The form of a naturally ventilated school of dentistry is dominated by the climate, especially in the tropics. In warm humid climates, confort is achieved by making the buildings shallow and orienting them in such away that there is miximum exposure of occupied spaces to the prevailing winds. Adequate shading from the sun is essential, as well as separation of the blocks so that there is no shielding of one block by another.

In hot dry climate, the buildings are oriented to keep exposure of external wall surface to the sun to a minimum. Orientation of occupied space is approximately North-South. Surfaces facing East-West which are unshaded, are kept to a minimum and the openings made as few as possible.

3.35 LIGHTING THE CUBICLES

In a dental treatment cubicle the dentists have to determine the exact colour of the teeth, he also wants to assess the finished denture in the same light. To this he needs light with the correct intensity and with a colour temperature similar to daylight.

The dentist has to see every transition from hard to damaged enamel, every change in the pulp, every nuance of colour in the oral cavity just as in day light. So that he can remove diseased matter without taking away more than is necessary from the healthy surroundings. To do all this, he needs light which makes out all edges and contours sharply and clearly, which brings out the filigree in even the finest structures and reproduces all nuances of colour true to nature.

Natural daylight is the most ideal source of light for a dental treatment unit, this corresponds to day light under a cloudless autumn northern sky, but due to the inconsistency of daylight i.e.illuminating differently in spring then in autumn. One can even perceive different colour reproduction in the morning, at midday and in the afternoon. The best thing would be artificial spotlight mouted on an extension airm on the dental unit see figure 3.12



The dental operating light.

fig 3.12

CHAPTER IV

4.00 CASE STUDIES

Case study is the study and documentation of existing design(s) similar in function to a proposed design.

In a thesis of this nature there is need for case studies, it helps in many ways some of which are listed below.

- It helps in knowing the types of equipment, their sizes, shapes, weight, vibration output, heat out put etc so that adequate measures can be taken when designing.
- It helps in knowing the types of services required e.g water, gas drainage system, electrical installation, sound insulation etc.
- It show how existing ones have been designed and their short comings, so that similar mistake can be avoided.

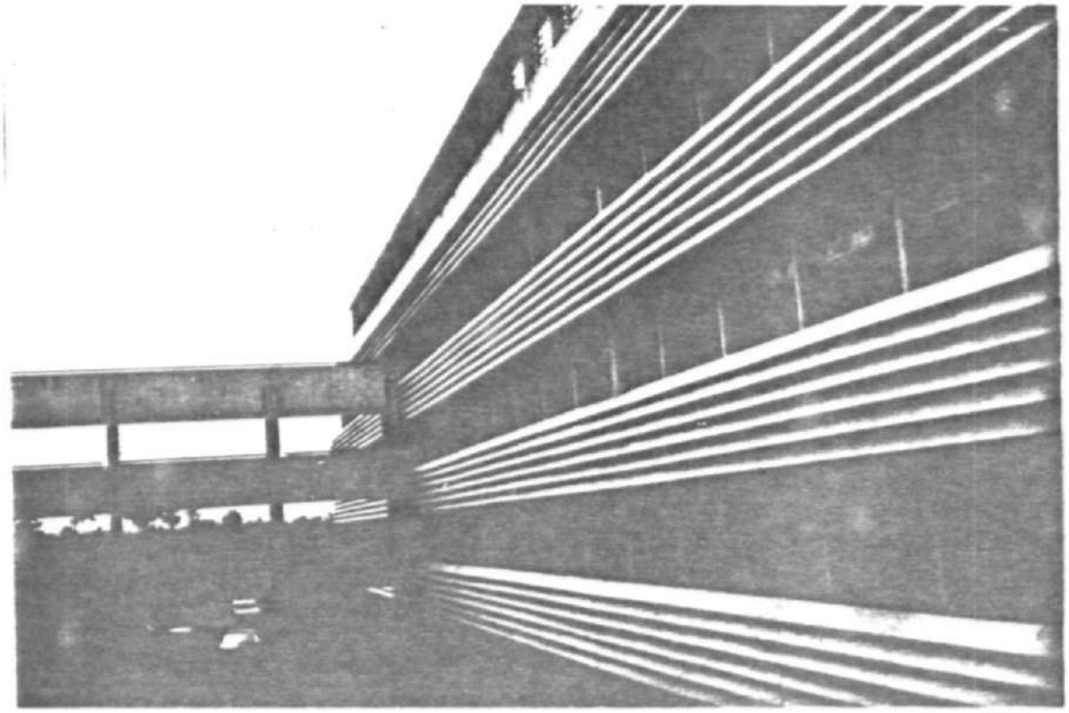
4.10 SCHOOL OF DENTISTRY UNIVERSITY OF IFE, ILE IFE

Location

The school of dentistry university of Ife, Ile Ife is located on the outskirts of Ile Ife. It is situated on the main campus of the University.

Layout

The School is a four storey high building, it occupies the second floor of the building while the department of Medical Microbiology and parasytology is on the ground floor and the department of Gynicology is on the immediate top floor, it is about 136m long as can be seen on plate 1. The students share the lecture theatre provided on the ground floor



SCHOOL OF DENTISTRY UNIVERSITY OF IFE
PLATE 1

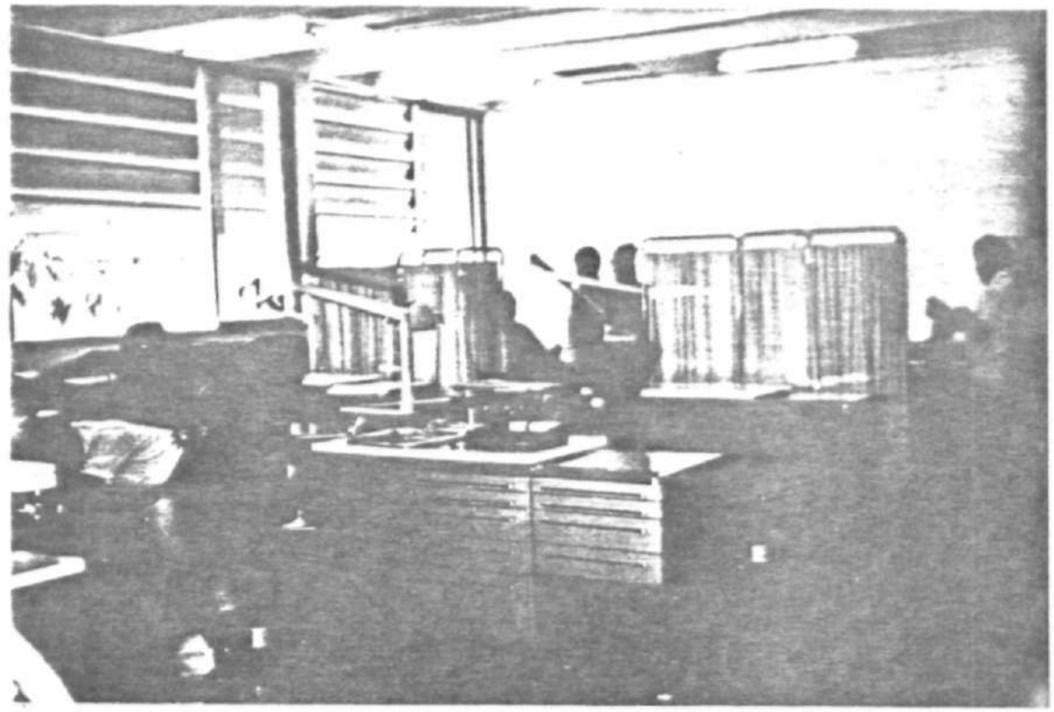


PLATE II
OPEN SYSTEM OF TREATMENT UNITS

with the other schools for their lectures.

Accommodation

There are three departments in this school all of which is headed by a subdean, the department are as follows:

- Restorative dentistry
- Maxilofacial surgery and pathology
- Oral medicine and preventive dentistry

There are also six clinics under the above mentioned departments:

- Maxilofacial surgery clinic
- Oral daignosis Clinic
- Children dental clinic
- Restorative dentistry clinic
- Othodontic clinic
- Pedodontics clinic
- Periodontology clinic

There are also 4 laboratories namely:

- Oral pathology laboratory
- Students prosthetics laboratory
- Technical laboratory and
- Phanton head laboratory.

4.11 CONSTRUCTION

Structures

The structure is of reinforced concrete columns arranged in a grid parttern with reinforced concrete beams and floors. The refilling material is of hollow blocks plastered and painted to finish.

Finishes

Wall finishes are mainly paints on cement, plaster, except in special rooms e.g. toilets and kitchens where white tiles are used and X-ray department where special precaut on against radiation necessitates the

use of concrete or barium plaster.

Floor finishes ranges from quary and marley floor tiles to grano, terrazzo to ordinary screed flooring.

Ceiling also ranges from painted under surface of upper floors to suspended ceiling.

Corridor

The main circulation space in the school building is a long corridor which ties all the rooms together. About 2.0m wide, it also serves as a sub-waiting space for patients waiting to see the surgeons. The result is that the corridor is always over crowded.

4.12 MERITS

These are positive values noticed in the school building some of which may be adopted.

- There is partial separation of public(patients) and private zone (students and staff).
- There is sufficient natural lighting and good cross ventilation in almost all the rooms.
- The open space arrangement of dental units in the clinic done by omitting the partitions so that there is no specific demarcation between units (as can be seen in plate III and IV) makes it possible for a given area to accommodate a larger number of dental units compared to the number contained when divided in the cubicles.

DEMERITS

These are negative values and care must be taken to prevent reoccurance:-

- In the clinics, there is the open space arrangement of dental units (see plate III & IV)

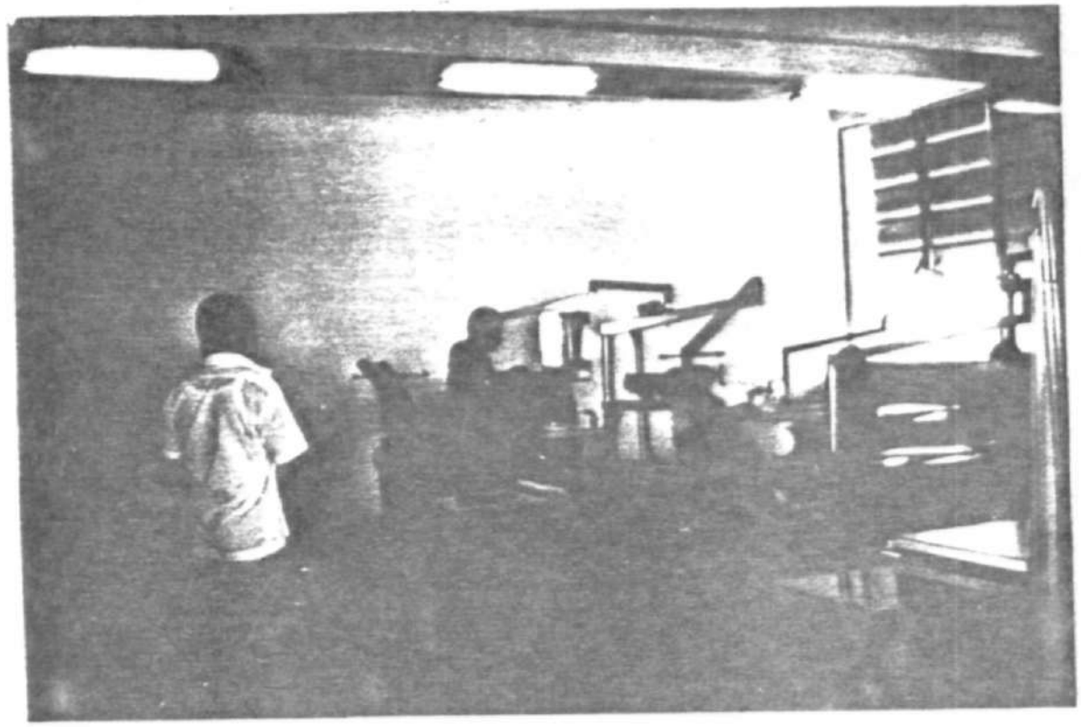


PLATE 3
OPEN SYSTEM OF TREATMENT UNITS
UNI. IFE

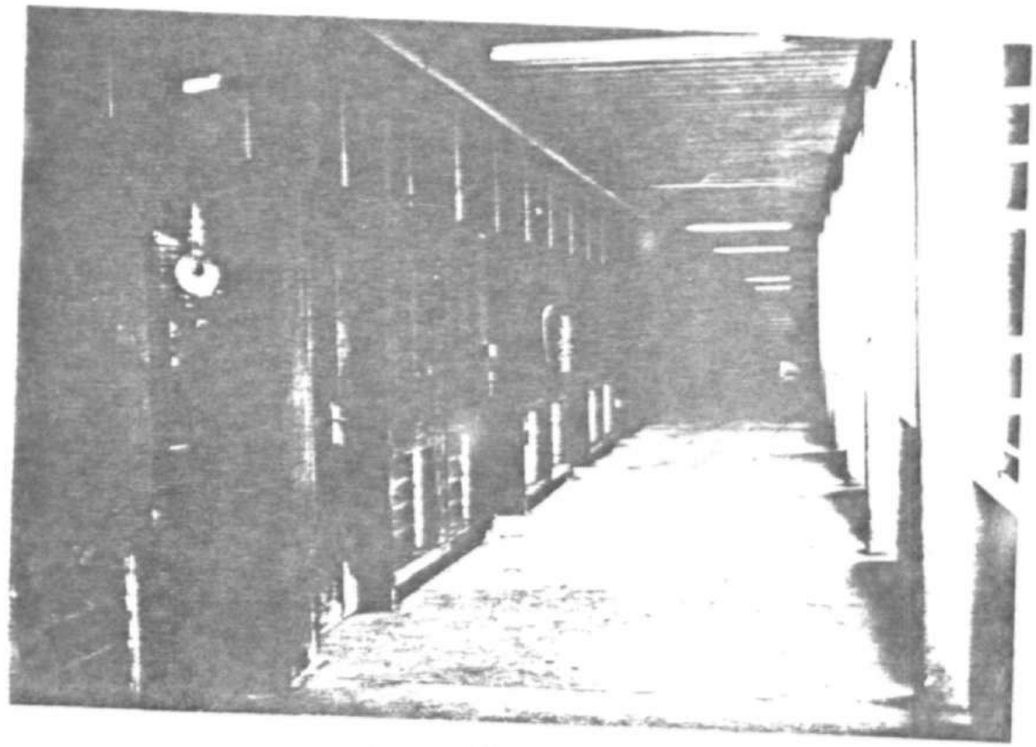


PLATE A
MAIN CONNECTING CORRIDOR
UNI IFE

which result in an unfavourable traffic pattern both for patients and the personnels. Sinks can be fitted only in groups at central points by so doing, observance of hygienic aspects is rendered difficult (as seen in plate III).

Only one movable instrument cabinet can be installed per dental unit. Patients may be disturbed by the open arrangement due to so many on lookers.

- There is no pharmacy attached to the school therefore the patients have to go a long way to collect their prescriptions.
- As can be seen in plate II the connecting corridor is rather too long.
- There is no room for expansion vertically or horizontally.

4.20 SCHOOL OF DENTISTRY UNIVERSITY COLLEGE HOSPITAL IBADAN

Location

The school is located outside the U.C.H. complex, but very close to it. The school is separated from U.C.H. by Queen Elizabeth road.

History

The building was designed initially as a maternity clinic, privately owned before it was acquired by the Federal Government and changed into a school of dentistry in 1977.

Accommodation

The maternity clinic building was converted in to the clinics and laboratories while the Doctor's Bungalow attached to it was converted to the Administrative block.

There are six clinics in the school namely:

- Periodotology clinic
- Conservative clinic
- Pedodontics clinic
- Oral diagnosis clinic
- Maxilofacial surgery clinic and
- Prosthetics clinic

The main operations takes place across the road in U.C.H.

There are also laboratories namely:

- Preclinical laboratory(Phanton head laboratory),
- Diagnostical laboratory,
- Staff Laboratory and
- Students Prosthetics laboratory

with casting, plaster and flaxing room; see plate 7 - 14.

Parking

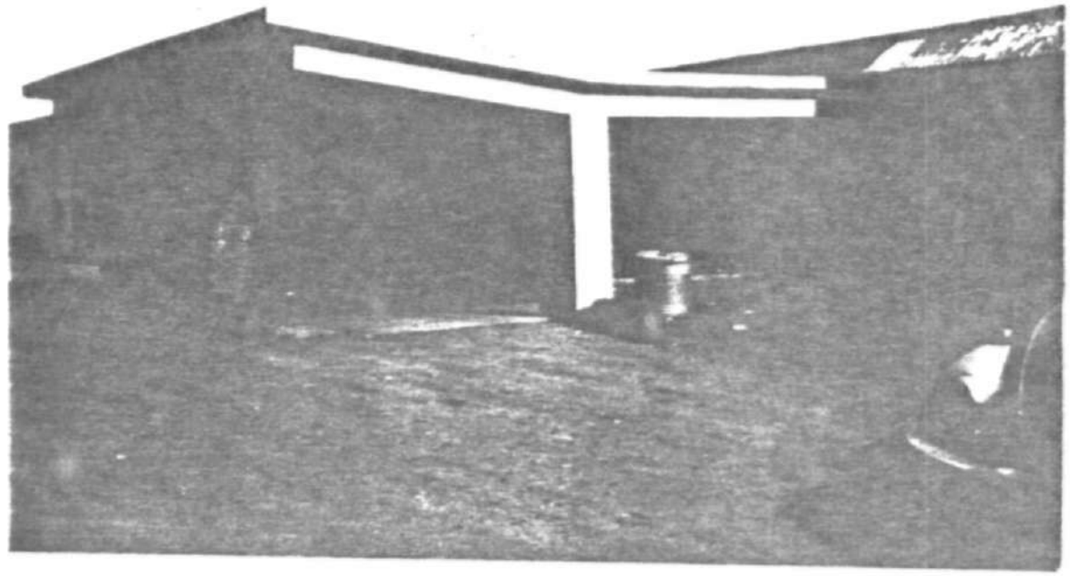
Because of the restricted site no adequate provision has been made for patients and visitors parking.

Merits

- Well ventilated and adequate waiting area see plate 15.
- Courtyard system used to achieve adequate ventilation and lighting in the building.
- Height of cubicles makes it possible for supervisor to see more than one student from a position, see plate 16.

Demerits

- Parking space is inadequate
- Reception area congested and no security see plate 17.



DENTAL SCHOOL UCH Ibadan
PLATE 5

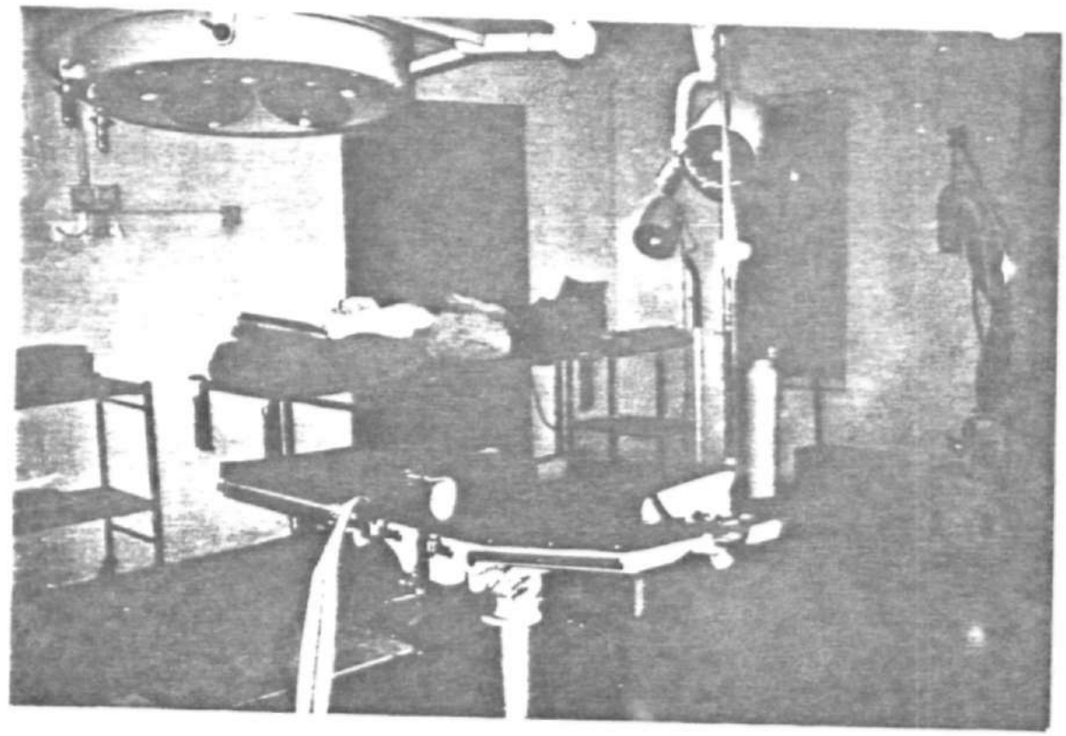
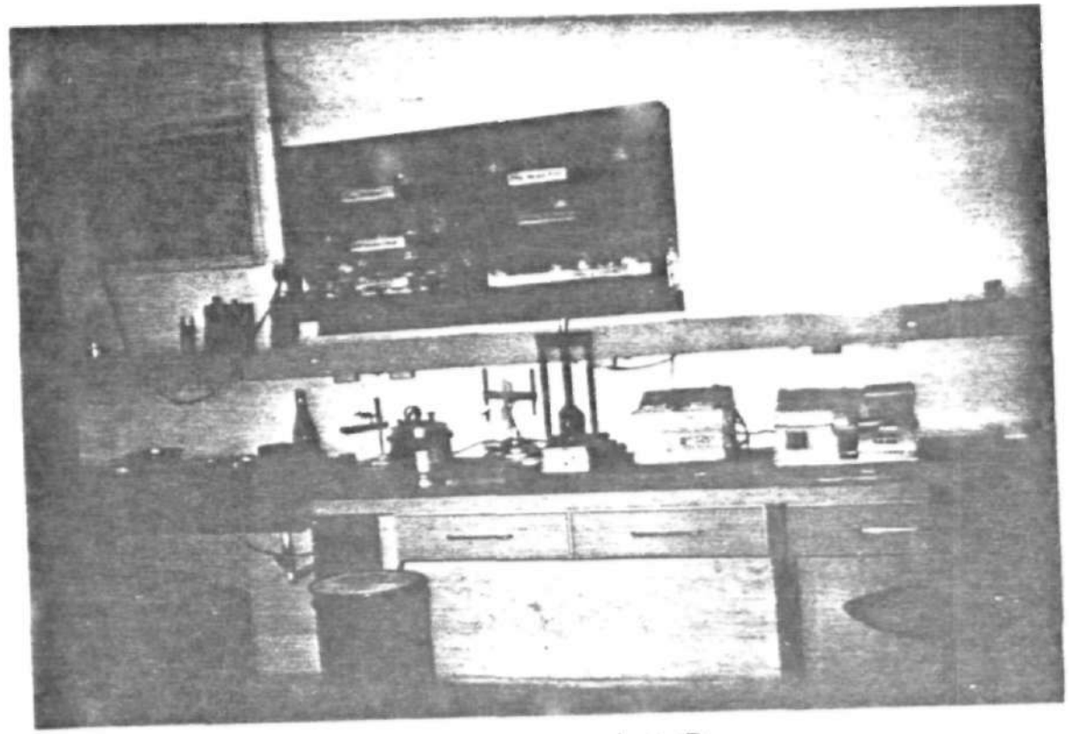


PLATE 6 OPERATING THEATER



(PLATE) 7 STAFF LAB.
DENTAL SCHOOL U.C.H Ibadan

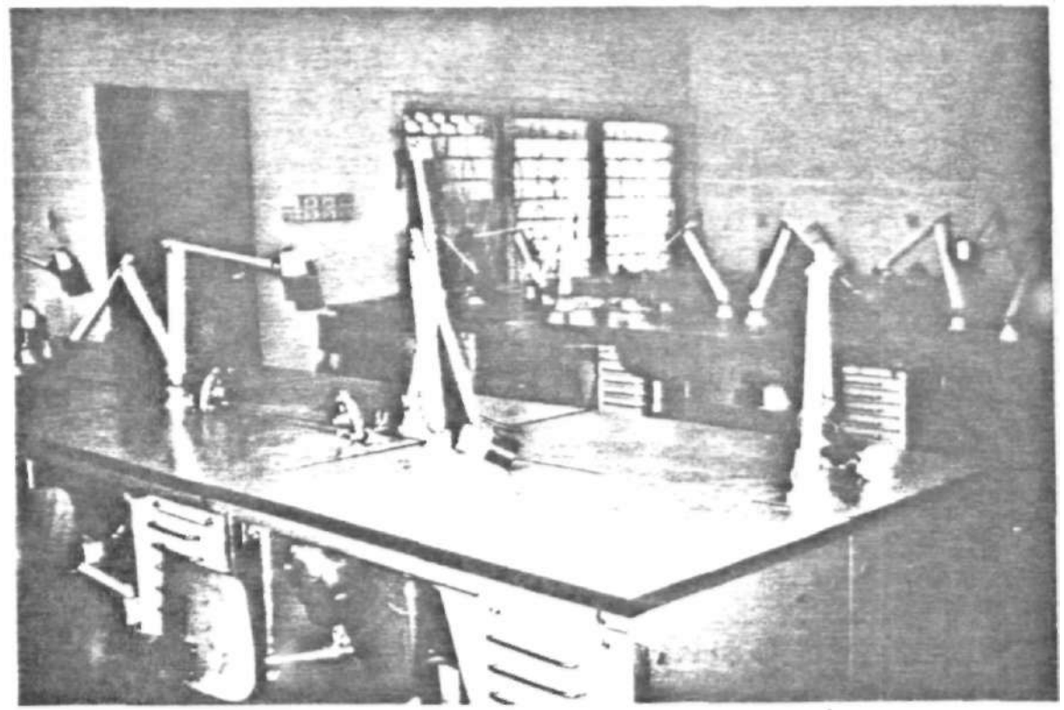


PLATE 8 PRECLINICAL LAB.
U.C.H Ibadan

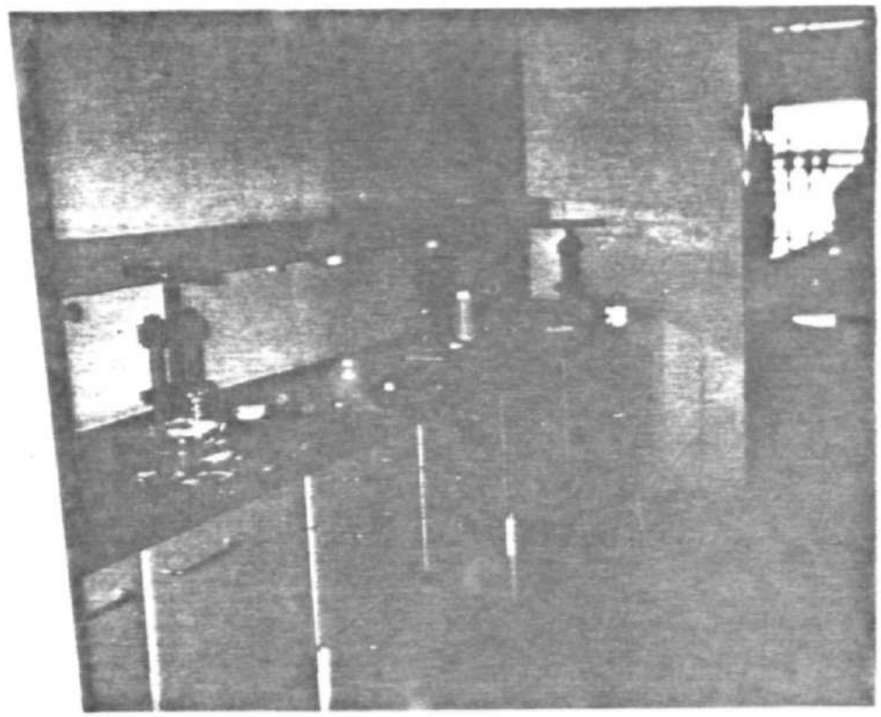


PLATE 9 FLASKING AREA
UCH Ibadan

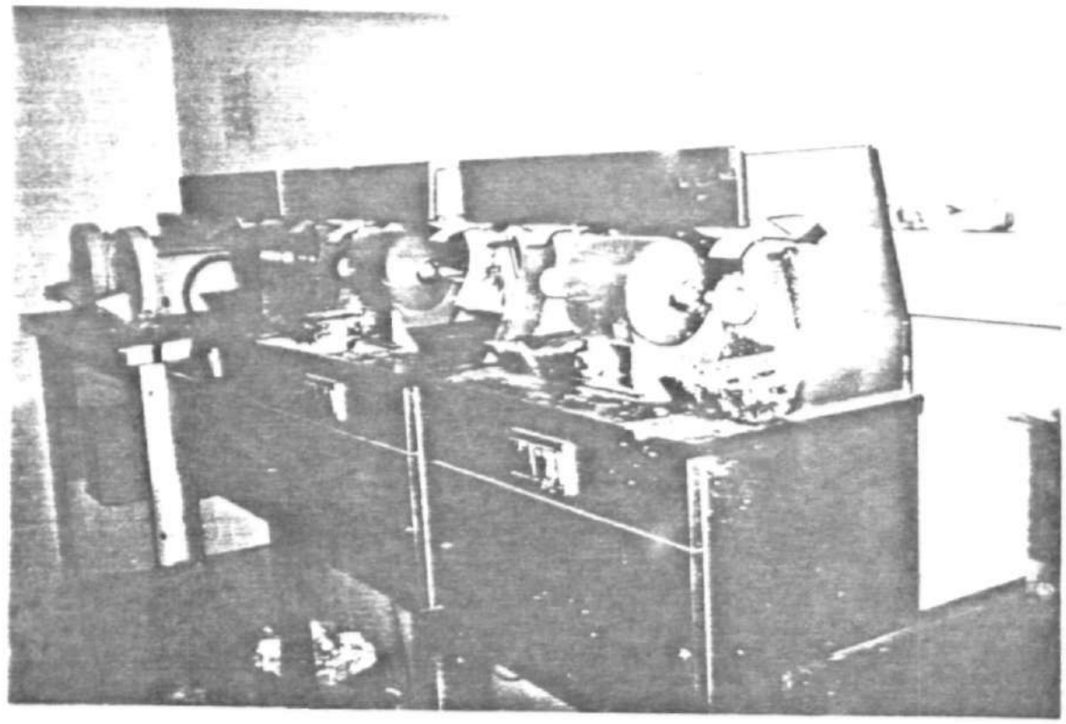


PLATE 10 POLISHING AREA.

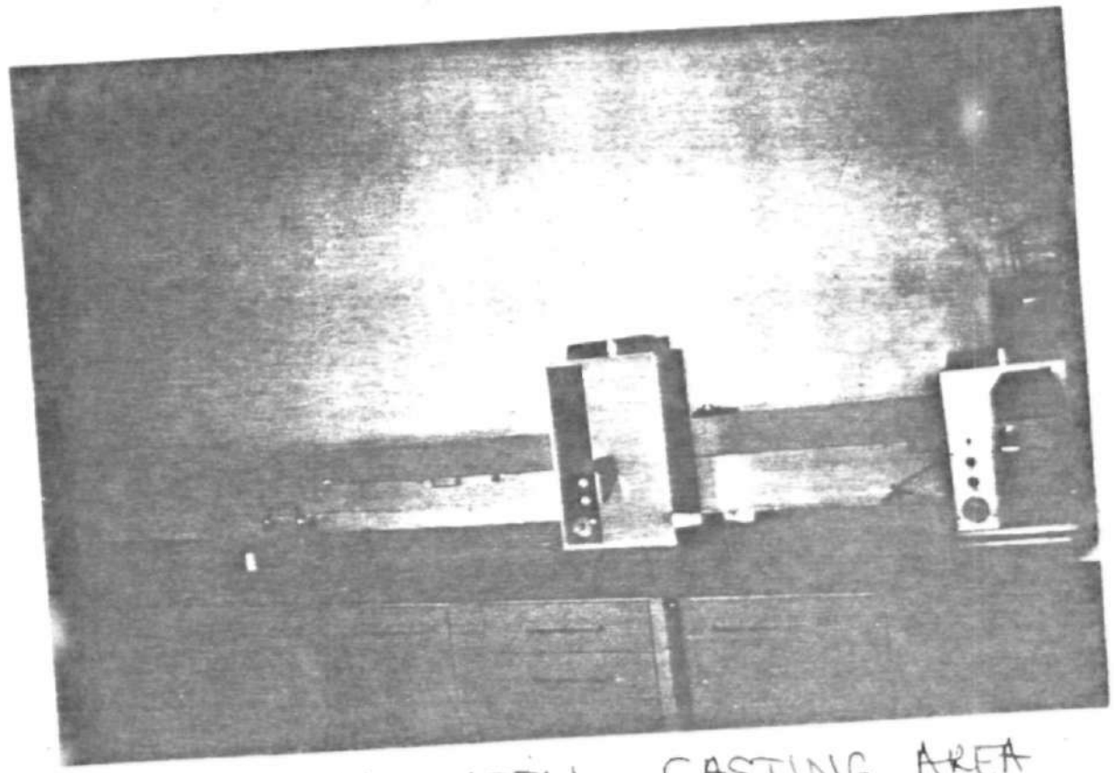


PLATE 11 METAL CASTING AREA
U.C.H Ibadan.

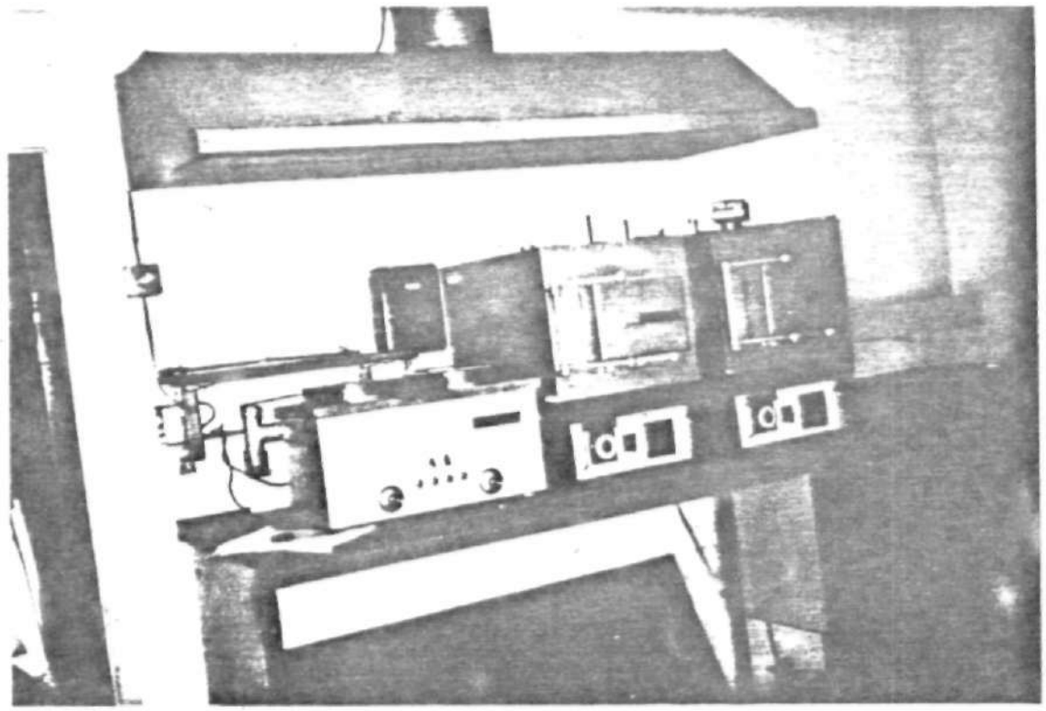


PLATE 12 MAIN CASTING AREA.

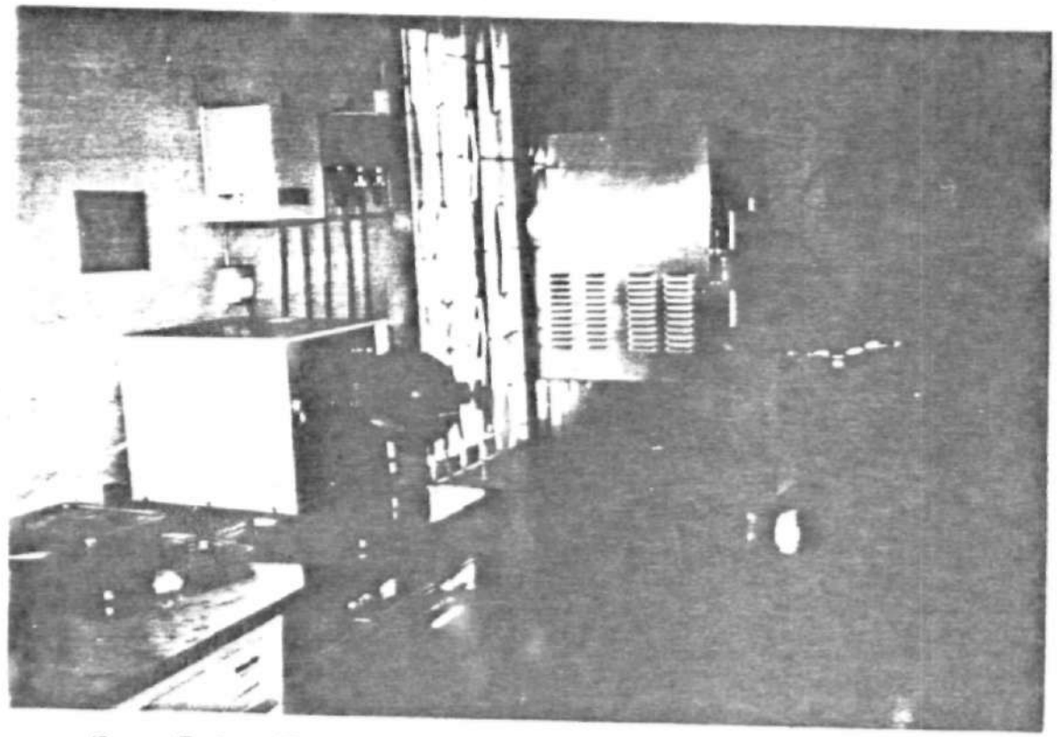


PLATE 13
CENTRAL STERILIZATION UNIT
U.C.H Ibadan.

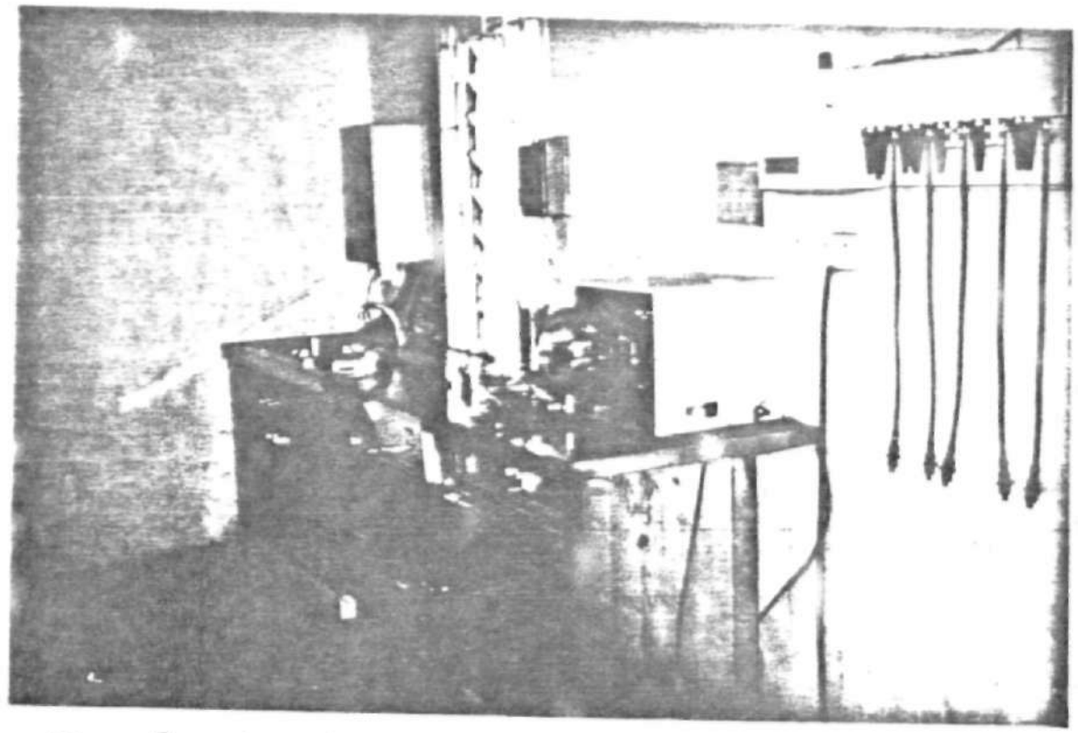


PLATE 14
DEPARTMENTAL STERILISING UNIT

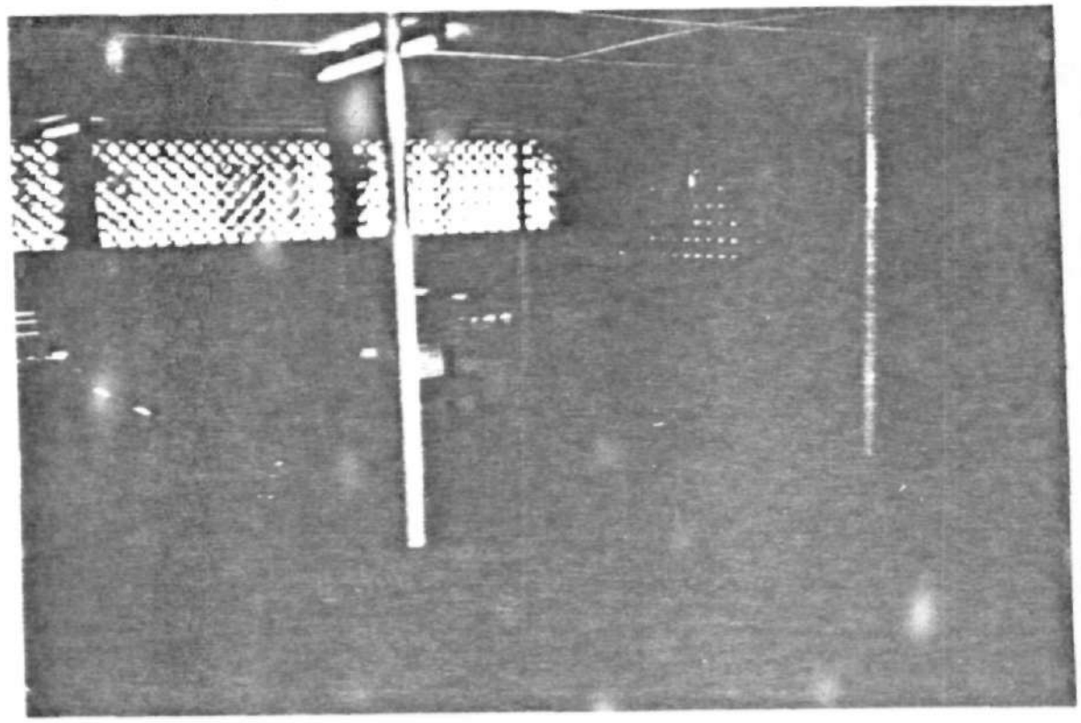


PLATE 15
MAIN WAITING AREA
U.C.H. Ibadan

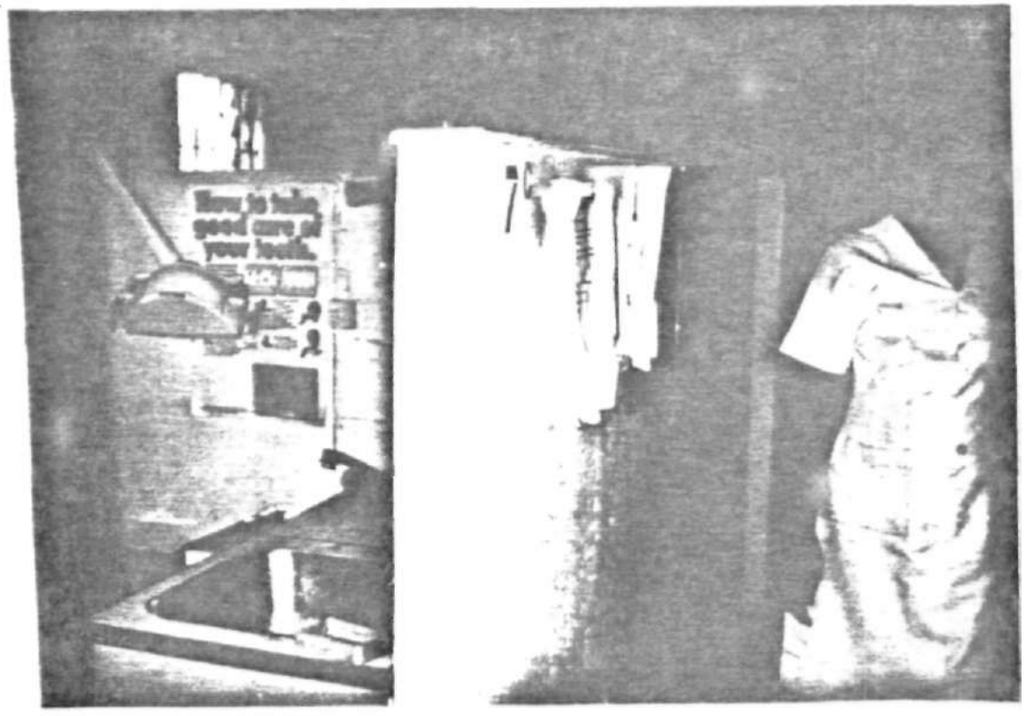


PLATE 16 TREATMENT BOOTH
U.C.H Ibadan

- Administrative block space is not sufficient for the workers.

4.30 SCHOOL OF DENTISTRY UNIVERSITY COLLEGE HOSPITAL LAGOS

History

The school is the first in Nigeria and was established in 1967 as part of then College of Medicine at Lagos Teaching Hospital with an initial intake of six students per year, the capacity has now increased to about 40 students. To meet the rising demand, a post-graduate programme has recently been incorporated into the curriculum of the school. Further more, the Dental school has expanded over several stages from one department to five departments at present. It has now achieved a considerable amount of autonomy as a division of Dentistry headed by a Dean.

Accommodation

The school consist of several blocks of buildings which are arranged at random within the blocks are the following:

- Conservative Clinic
- Prosthetics Clinic
- Child Dental health clinic
- Oral hyginic clinic
- Oral Diagnostic Clinic
- Oral surgery clinic
- Operating room
- X-ray/dark room
- Othodontic clinic
- Prosthetic clinic
- Central sterilization unit
- Lecture rooms
- Staff rooms
- Entrance/Waiting/records room

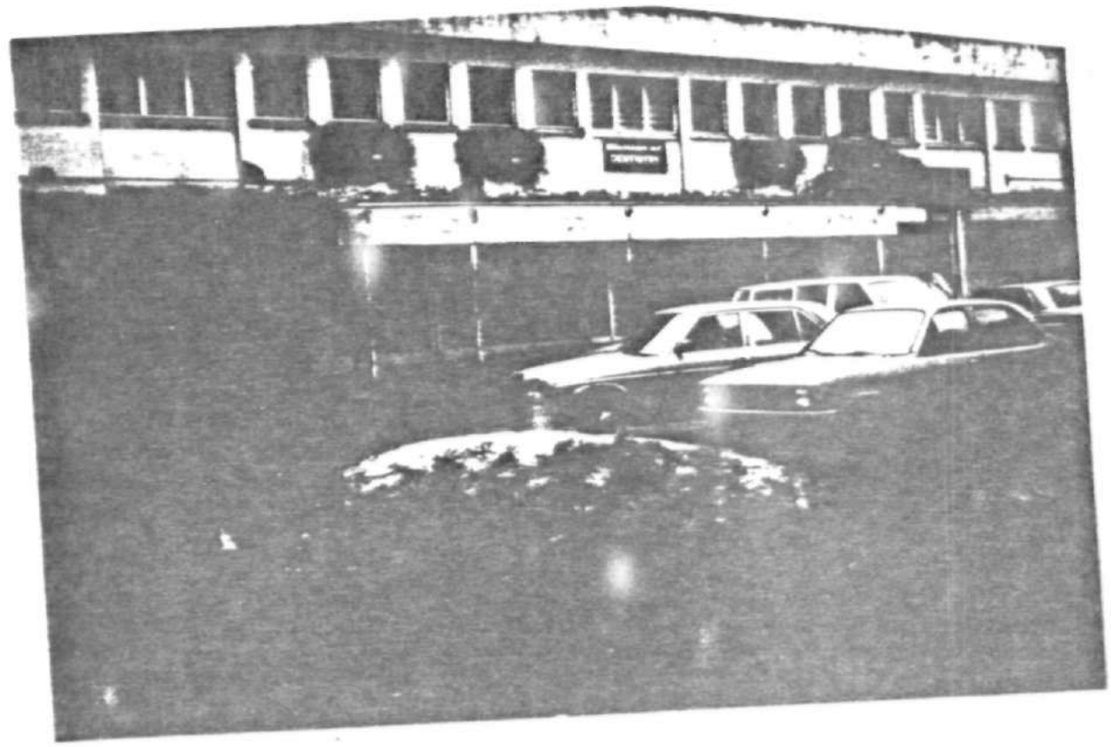


PLATE 17
SCHOOL OF DENTISTRY LUTH Lagos.

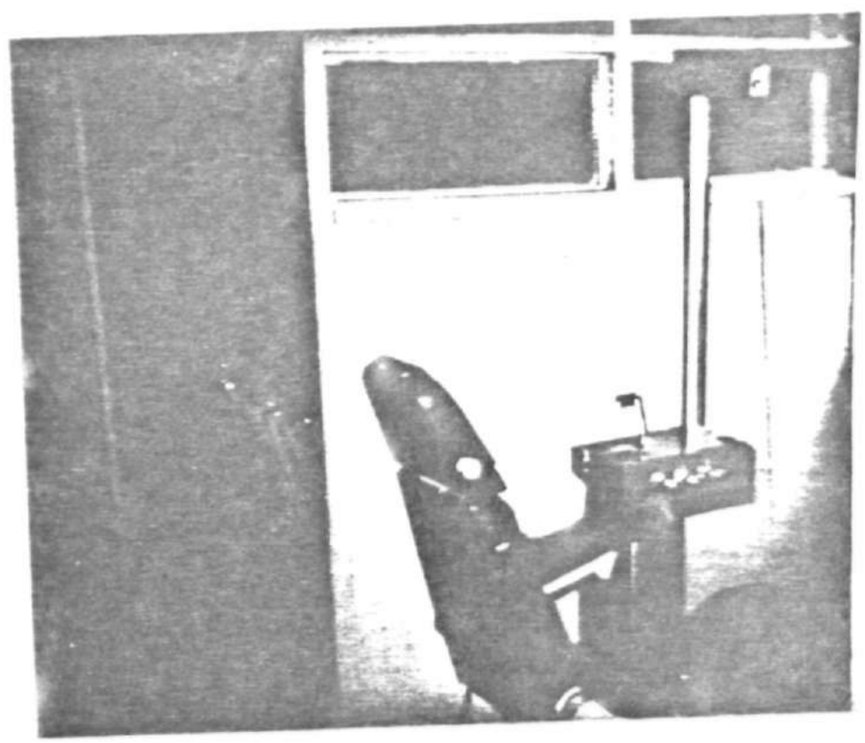


PLATE 18
TREATMENT BOOTH

- Students Laboratory(Polishing, Casting Technician rooms)
- Injection/Pharmacy room
- Technologyst room
- T.Cs. and
- Store room.

Merits

- Arrangement of phanton head table gives the most economical space usage without hindering the activities see plate 19.
- Cubicle arrangement in othodontics(that is set of 4 dental units) economical but at the same time hygenic aspect is not hindered.

Demerits

- Compressor machine too close to clinics thereby disturbing with noise.
- Cubicles in resterative clinic is rather inadequate.
- Main waiting area is inadequate.
- Expansion not taken into consideration therefore no room for expansion.



PLATE 19
PRECLINICAL LAB
LUTH Lagos

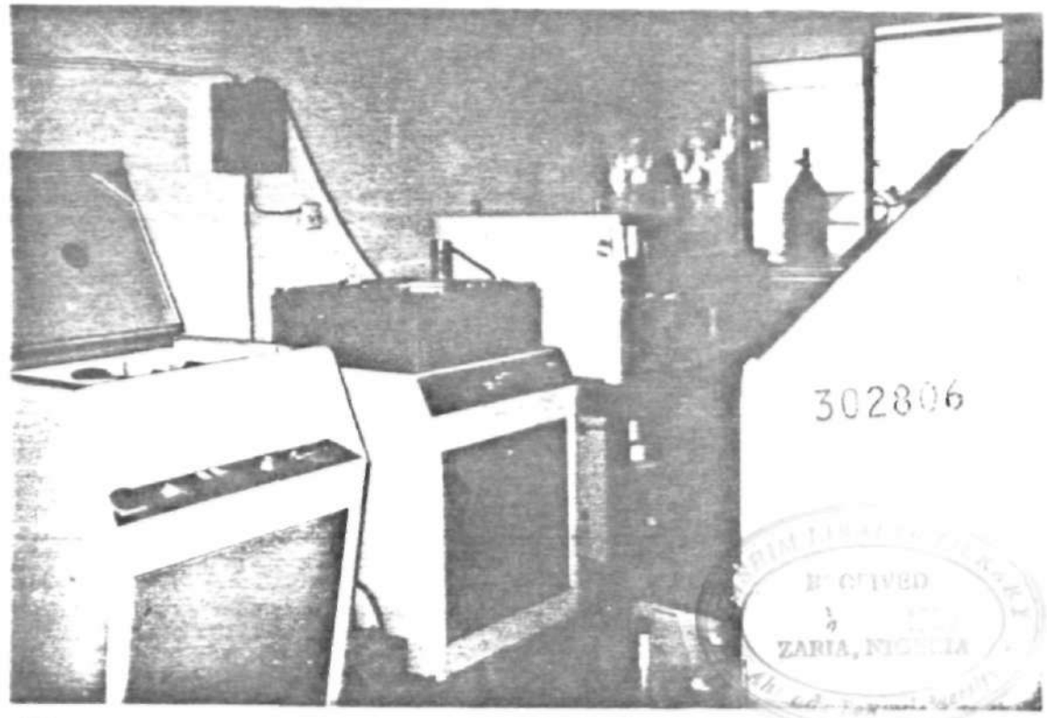


PLATE 20
CROME COBALT MOLDING ROOM

4.40 NEW CLINIC AND POLICLINIC FOR DENTAL, ORAL AND MAXILLARY PATIENTS IN GIEBEN, JUSTUS-LIEBIG UNIVERSITY

History

During the summer session 1971 it was possible for 25 students of the first and 25 of the sixth terms to take up both preclinical and clinical studies of dentistry at the Justus-Liebig University at Gieben. Accordingly, it took only 1½ years to build up a new clinic and to establish a new course of study, for until the summer term 1971 the Justus-Liebig University had been the only complete University in the Federal Republic of Germany, where the study of dentistry was impossible.

Structure and Organisation of the Clinic

Of the nine storeys (basement, ground-floor, first to sixth upper storeys, mechanical floor) of the building (plate 22a) erected with the aid of prefabricated slabs (GieBen System), whose extension planning and building supervision had been entrusted to the architects Beuermann and Dettmar of GieBen, the fifth and sixth upper stories are still been completed by a concrete core, containing a number of differently used dark rooms, all storeys are divided into two sections (see plate 21b).

In the basement, the "service rooms" (ventilation plant, electrical main distribution centre, compressed air system, distribution of sanitary and heating system etc.), the cloakroom for students and patients, the workshop of the clinic, the store rooms and archives as well as the preclinical demonstration rooms have been accomodated.

On the ground-floor, we find beside a small entrance hall with porter's gate on the one half of the storey the group of rooms for primary examination, the Policlinic (see plate 21b) and the dental surgical department.

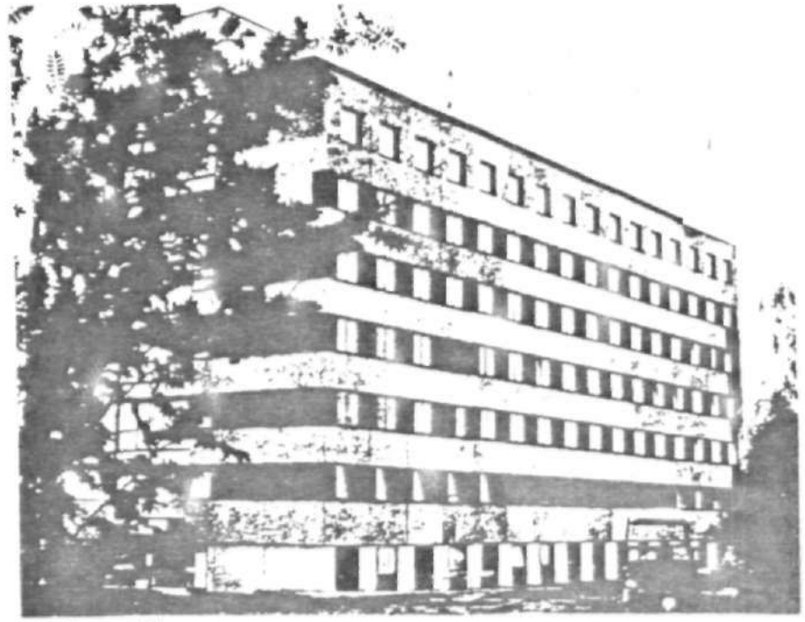


Plate 11a Exterior view of the clinic



Plate 11b Treatment bay in the policlinic



Plate 11c Section of the preclinical laboratory

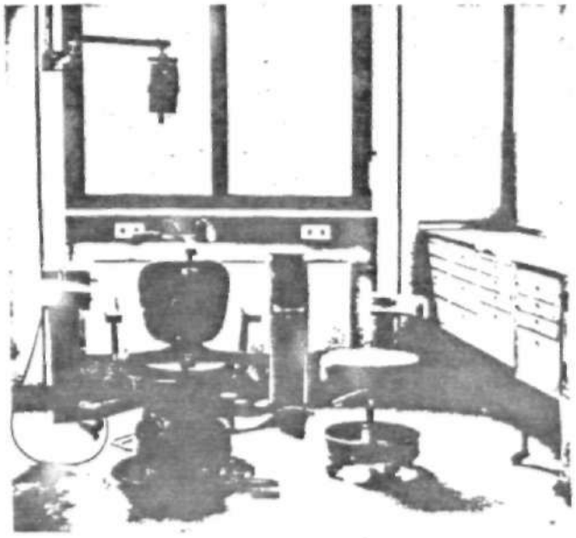


Plate IIa

Treatment bay in the orthodontic department

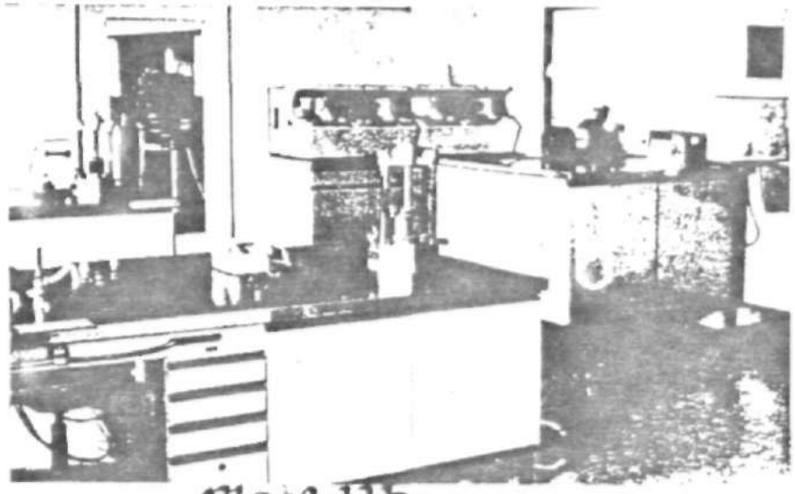


Plate IIb

Partial view of the dental mechanics' laboratory



Plate IIc

Treatment [illegible]y for students (prosthetic and conservatory department)

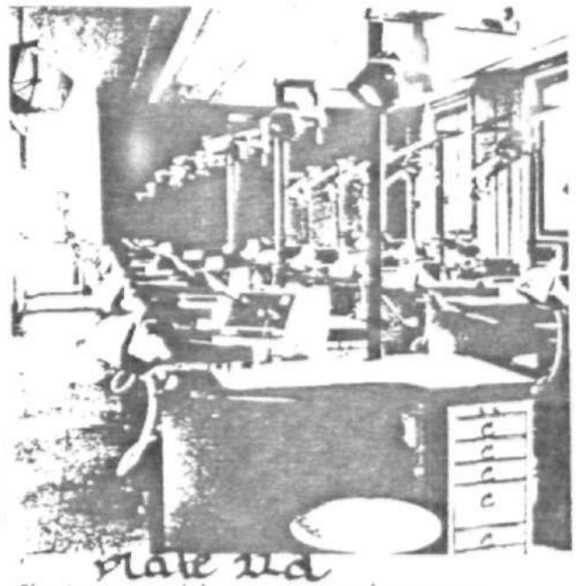


Plate IId

Phantom room of the conservatory department

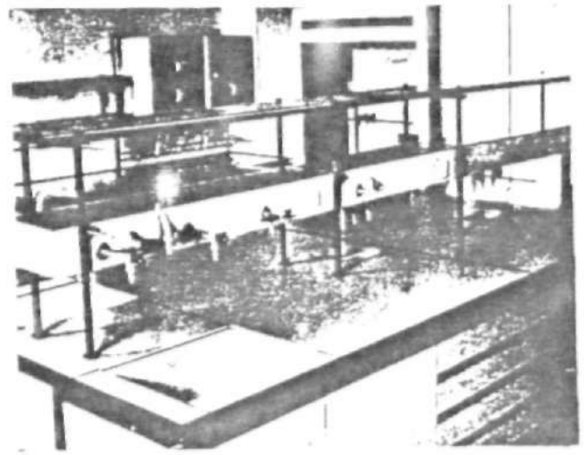


Plate 23a

View into a scientific laboratory

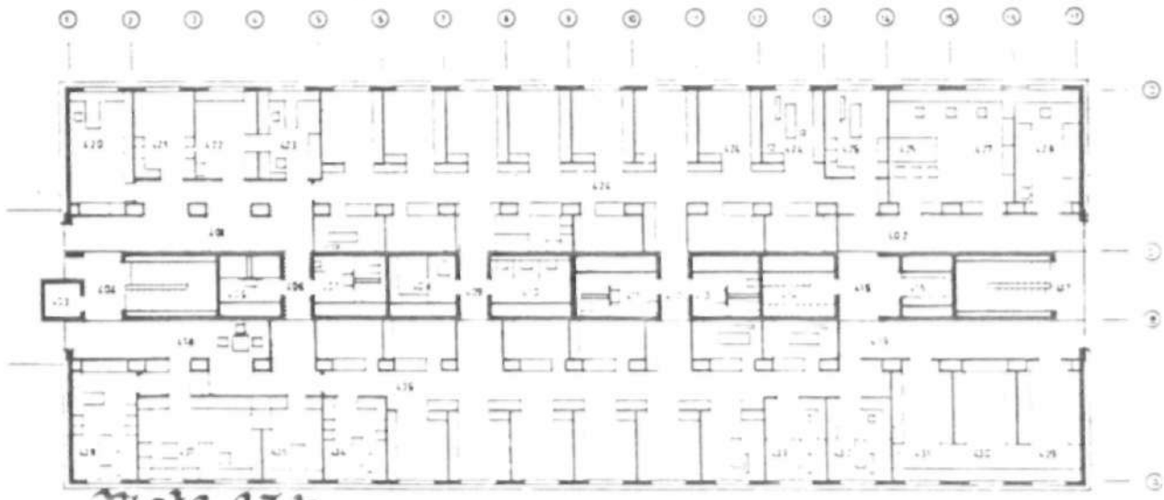


Plate 23b

Layout of the conservatory department (axial measurement = 3.125 m, length of the clinic 50.84 m, width 20.88 m)

401 Waiting area
405, 407, 411, 413 WCs for patients personnel and students
408 X-ray room – irradiation
410 Mouth rinsing facilities
414 Students' cloak room
418 Waiting room – head of department
420 Duty room of assistant medical director
421 Treatment room of assistant medical director
422 Assistants' room
423 Waiting room
424 Lecture room I (15 treatment bays for students)
425 Assistant's room II
426, 427 Gathering assistant's day room and conference room
428 Scientific laboratory
429 431 Biology laboratory for students (25 working areas)
432 Assistant's room
433 Assistant's room III
434 Assistant's room IV
435 Lecture room II (12 treatment bays for students)
436 Secretariate – head of department
437 Duty room – head of department
438 Treatment room – head of department

Just as all demonstration rooms, the operating and surgical lecture room is equiped with the most up to date anaesthesia monitoring equipment.

On the other side of the ground floor, are the administration and patient reception, the central X-ray room and the preclinical department (plate 21c).

The major part of the upper storey is at the disposal of the orthodontic department (plate 22a). Moreover, on this storey the rooms for the dental technicians (plate 22b), the central material issue and dental office rooms are located.

The second upper storey is reserved for the Prosthetic department, it has 17 dental chairs for the students. With the so-called 50-beginners model (i.e 50 beginners per year), authoritative for BieBen, this means that three students have to share in one working area in the prosthetic lecture room, whereas in the so called clinical laboratory one working area is available to each student. For the assistant, four treatment rooms (plate 22c) for the assistant medical director one office and treatment room, and for the head of the department one group of rooms, comprising a Secretariat office and treatment room, have been created.

On the third upper storey the "Central Rooms", such as secretariat and office of the Managing Director , duty room of Senior sister and the head of the administration conference room and Library as well as the phanton course room of the conservatory department (plate 22d) with 25 phanton units, which were adopted to a large extent to the later treatment on the patient are located.

Finally on the third upper storey still two demonstration rooms for 25 or 75 to 100 students, respectively,

moreover, the photorooms and the scientific laboratories (plate 23a)

- histological,
- Biochemical,
- bacteriological and
- material science laboratory). The

initially mentioned and partly air-conditioned dark-rooms of the core are used on this floor as microscoping room, weighting room and for election microscopy, among other things.

In the conservatory department, which is located on the fourth upper storey (plate 23b), 25 treatment cubicles (see plate 22) have been set up for the students, which means two students sharing in one working area. The same numerical ratio applies also to the in-lay laboratory, which has also 25 places for double occupancy, in this connection, mention should be made of the fact that all working areas for students in the lecture rooms and in the technical laboratories of the clinic were completely equiped with the necessary instruments.

In the fifth upper storey, which is still being completed, there will be created soon; a periodontal department with eight working units. The planned department of preventive dentistry and pedodontia, which is closely connected to the periodontal department, will be likewise provided with the same number of dental units.

4.50 GRONINGEN UNIVERSITY DENTAL SCHOOL

History

The ground stone was laid in February 1969. The two

Rings are finished and already in use. The T-shaped modern stell/concrete construction, *are 67* and 57 metres long respectively and. have one subterranean level, three and four upper levels respectively.

There are *66* surgeries available for the approxemately 18() students. The new building in 184 dental units i.e. patient chair and operating light (plate 246).

Cubicles

All cubicles have the uniform measurement of 250 x 250cm with portable cabinets and a complete surgery Each window is proportional to the size of the cubicle.

Services

All equipment for the buildings air-conditioning system, the gas, compressed air, hot and cold water supply as well as for the central suction system is housed in the basement. Workshops, cloak rooms, a canteen for the students and the dental laboratory for technicians are also in the basement.

The reception area (plate 25c) with central files , large waiting room, X-ray department equipped for taking single tooth pictures, panorama (orthopentomograph) colour pictures as well as a photographic laboratory are in the basement.

The big auditorium with separate entrance from street and large lobby seats 264 people.

The orthodontics department is on the ground floor and first storey. The prosthetics department is is second, third and fourth levels, respectively. The con-

sarvative and periodontics departments are located second floor. Each department has its own facilities for treatment and offices for the dentists and assistants.

Each floor houses has a dental laboratory for stu-dents,

lecture rooms, training course facilities, X-ray

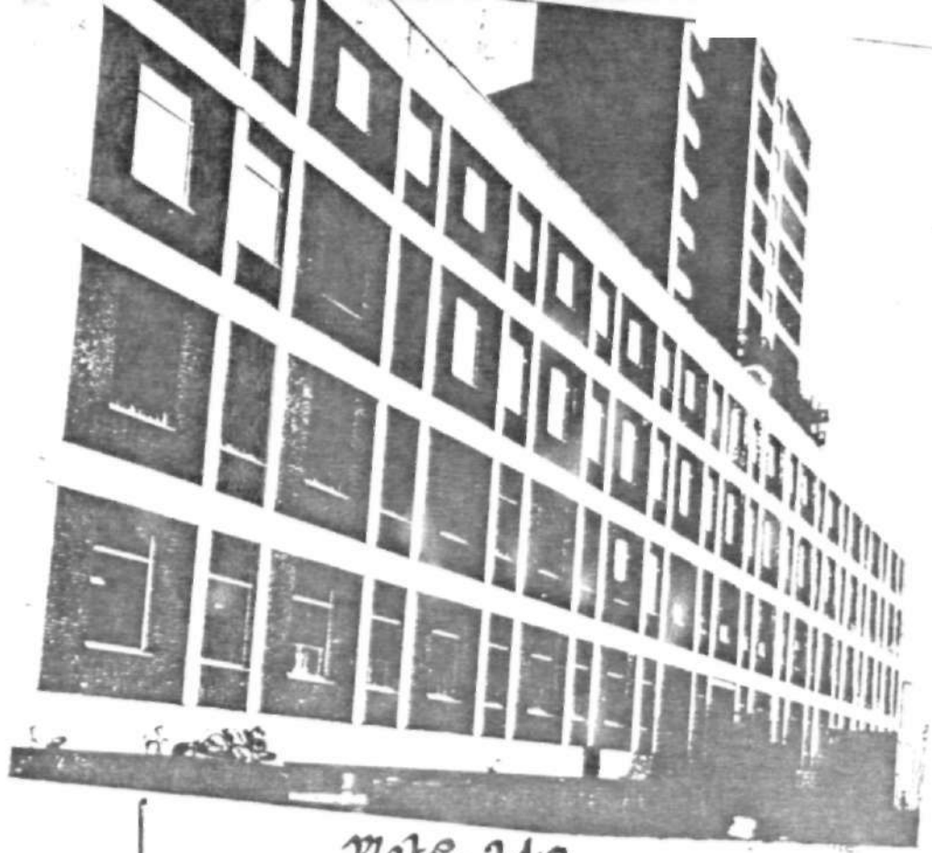


Plate 24a

One of the spacious surgeries in the Prosthetics Department

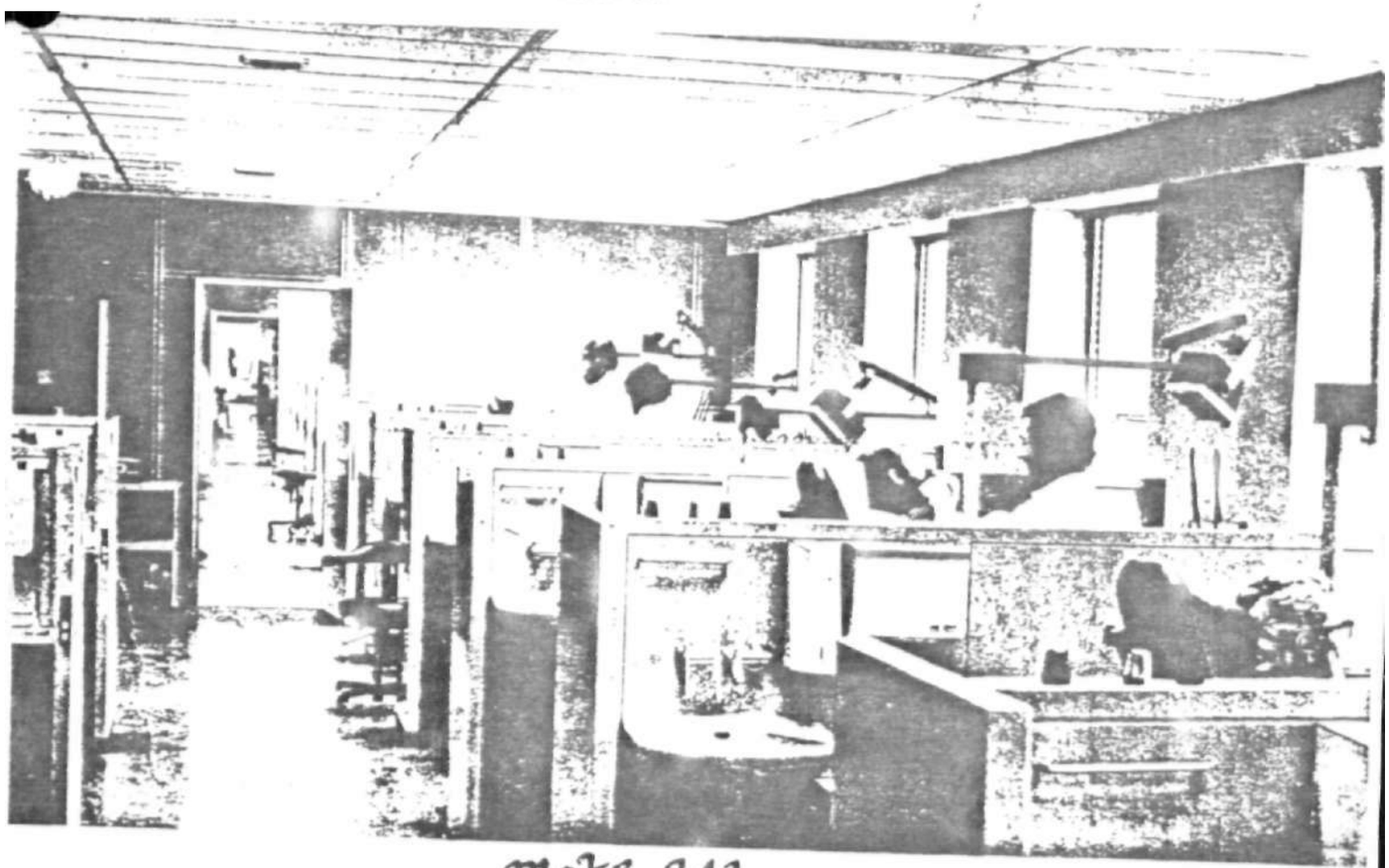


Plate 24b

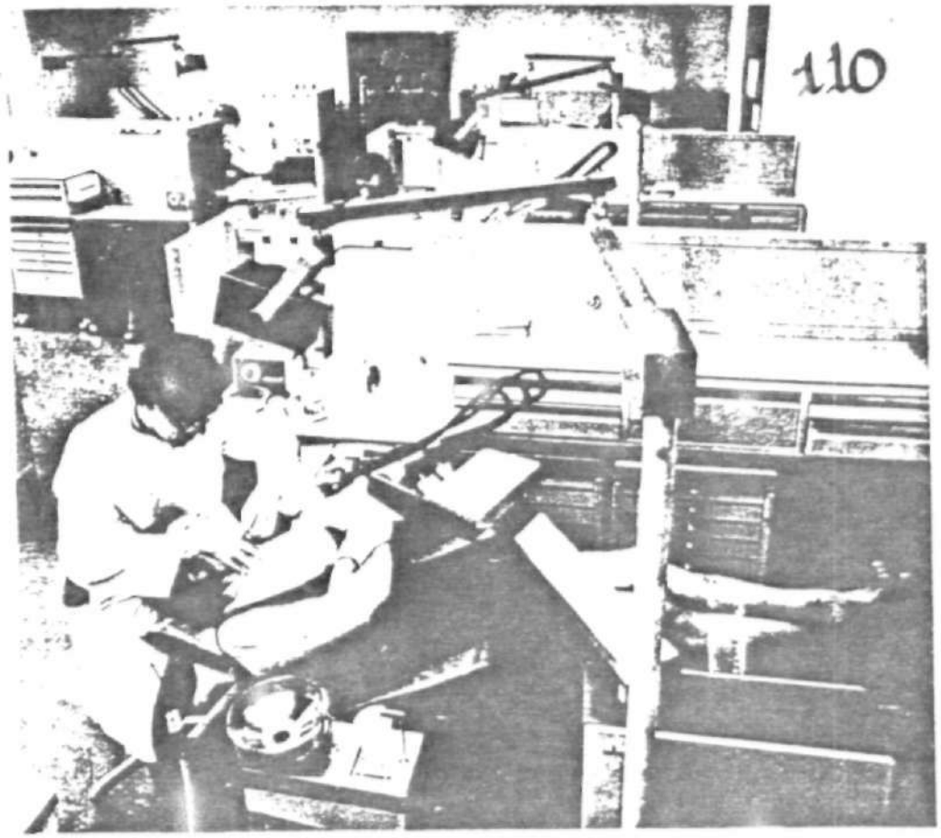


Plate 25a.

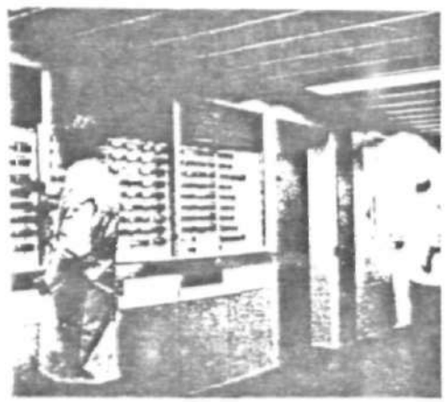


Plate 25b



Plate 25d



Plate 25c

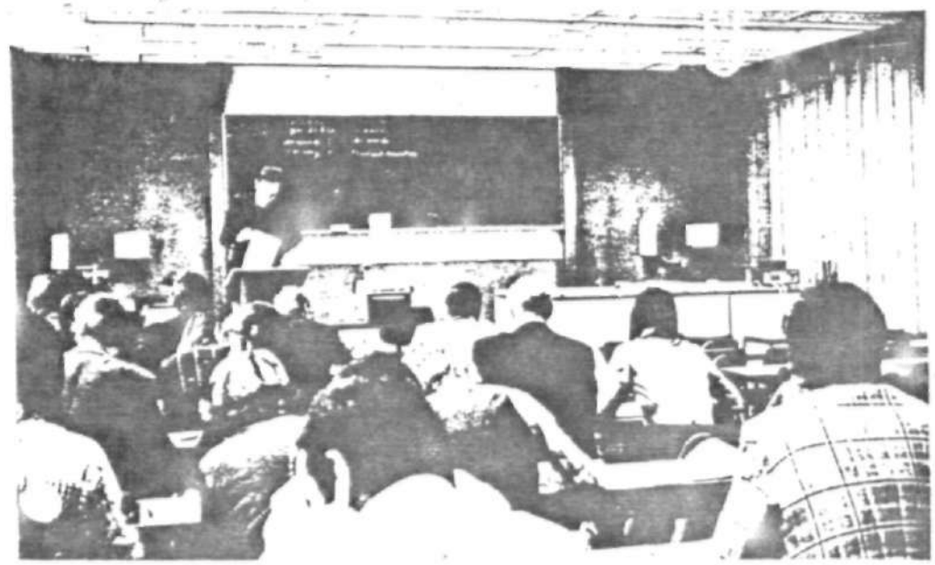


Plate 26a

Each floor has several small auditories and lecture-rooms.



Plate 26b

The central dental laboratory for the clinic's dental technicians



G The clinic has

room equipped for tak ng pictures of a single tooth and waiting rooms.

The central sterilization department is on the second floor.

All rooms and hallways have an ample amount of build in cabinet which also house the power lines, etc.

The lighting for the surgeries is a uniform 1, 500 lux, 1,800 to 2,000 lux for the laboratories. Each building wing has two elevators.

Lights in the surgeries signal arrival/departure of patients or students. Members of the staff can be contacted on the wireless paying system.

CHAPTER V

5.00 THE SITE

Nigeria today with a population of about 100 million has only four dental schools Dr. A.O. Osakwe retired Medical Director of the Nigeria Railway Corporation put the ratio of the dentists to Nigerian population as 1:50,000 which is for too much for a dentist to cope with. The four existing schools of dentistries are located in the Southern part of the Country. The Schools are school of dentistry LUTH Lagos, School of Dentistry UCH Ibadan, School of Dentistry University of Ife, Ile Ife, School of dentistry Benin. Therefore to redress the imbalanace between the Northern and Southern parts of the Country I feel a school of dentistry is long over due for the Northern part of the Country.

5.10 SITE SELECTION CRITERIA

Dental educators generally prefer certain locations for a dental school, The obvious choice is a University campus, it has impressive advantages like:

- offering students and faculty a richer cultural life and often a more pleasant environment.
- Adequate housing and student facilities may be more readily available than in other locations.
- If the University also has a medical school on campus, students and faculty can enjoy a close association with other health professions.

Taking all the above mentioned advantages into consideration I have decided to locate the proposed school of Dentistry on the site of the New Ahmadu Bello University teaching Hospital Shika, see figure 5.1 so that it works in close contact with the hospital.

5.20 LOCATION

(a) General

The site chosen is in Zaria in Kaduna State of Nigeria. The location and relief of Zaria is longitude 7°38'E, latitude 11°10"N and altitude 685 metres.

The built up area of Zaria is formed by the five fairly distinct Urban quarters namely Zaria city, Tudun Wada, Sabon Gari, Government Reserved Area and Samaru (University Complex).

The site is part of the new Ahmadu Bello University teaching hospital which is part of the main campus Samaru. The University started as College of Arts, Science and Technology in 1945 which expanded rapidly into the Ahmadu Bello University main campus.

The evidence of basic grid street pattern does little to organise the growth of the area which has taken on the strip character of development along Sokoto road, Samaru has developed with unpaved streets, open drains and minimum of services.

(b) Geology

Zaria urban area is largely underline by undifferentiated pre-cambrian basement complex formations comprising both igneous and metamorphic rocks.

The igneous rocks are mainly Biotite Gneisses and older Granites. The Biotite Gneisses are mainly in eastern half of the area with outcropping in the stream valleys. They are mainly composed of quartz, oligoclase and biotite of medium of coarse grain

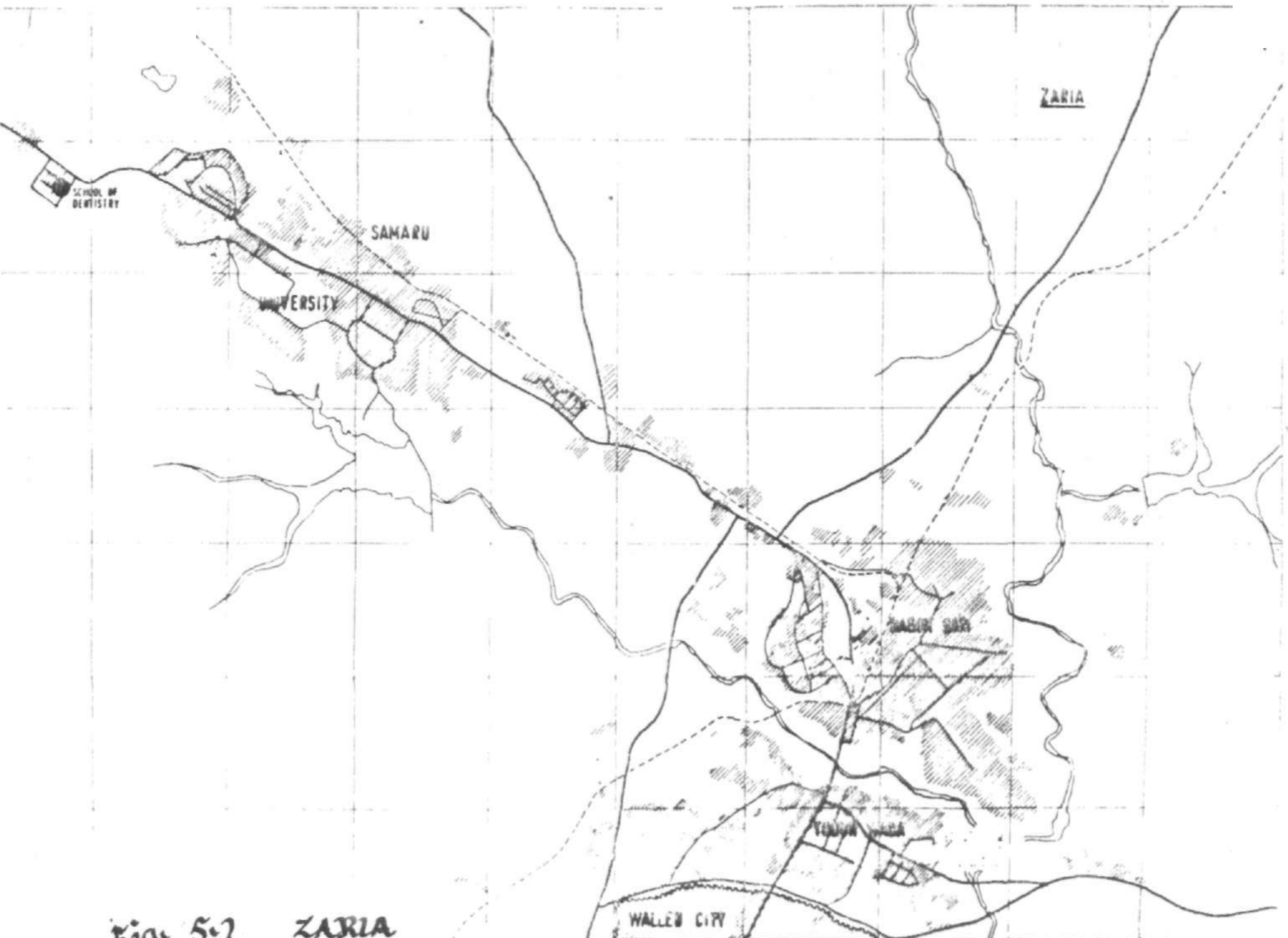


Fig. 5.2 ZARIA

and are moderately foliated rocks. The older Granites are seen on the surface in form of inselbergs and low out crops of granites in many places.

Superficial deposits include older and younger alluvium. The laterites are distinguished by a number of variables, while the older ones are red-brown in colour, cellular, ralatively free from impurities and up to 20 feet thick, the younger ones are browner, less cellular, less free of imparities, and rarely more than six feet thick.

The older alluvium deposits are of five gray-brown sands, clays sands and gravels of between 15-40 feet thickness, while the younger alluvium consists of grey-brown sands, silts and clays of up to 30 feet thick suitable for most building foundations. The harmattan winds annually deposit large quantities of dust which form part of the alluvial deposit.

(c) SOIL

The soil is part of the "Zaria Soil Group" which is known to have covering material of up to 14feet in depth. The soil material consist of several feet of deposited silty sand overlying sedentary decomposed rock. The soils of this group are normally heavy rains and also tends to dry out and crack during the dry season.

Alluvial soils occur in many areas and are subdivided into alluvial sands and alluvial clays. The former are associated with the low lying area adjacent to the major rivers galma, kubanni and saye and consist of several feet of greyish white loamy coarse sand with layers of gray heavy mattled clay accurring at varying depths within the profile.

(d) VEGETATION

Zaria lies in the natural vegetation zone known as Northern Guinea savanna in which Isoberlinia doka, Isoberlinia dalzidii and uapaca togensis are among the most common trees usually mature trees are beteew 10 and 15 metres high

with broad leaves and crowns almost touching, outside the tree crowns but in the woodlands, well developed grass layer and direct shrubs can be found.

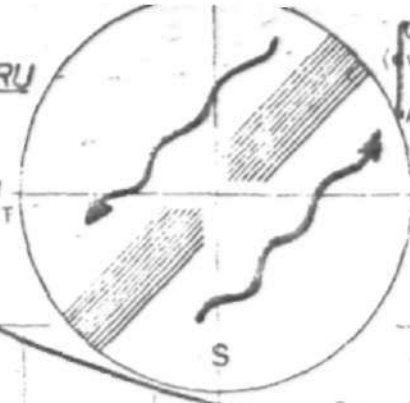
5.30 CLIMATIC CONDITIONS

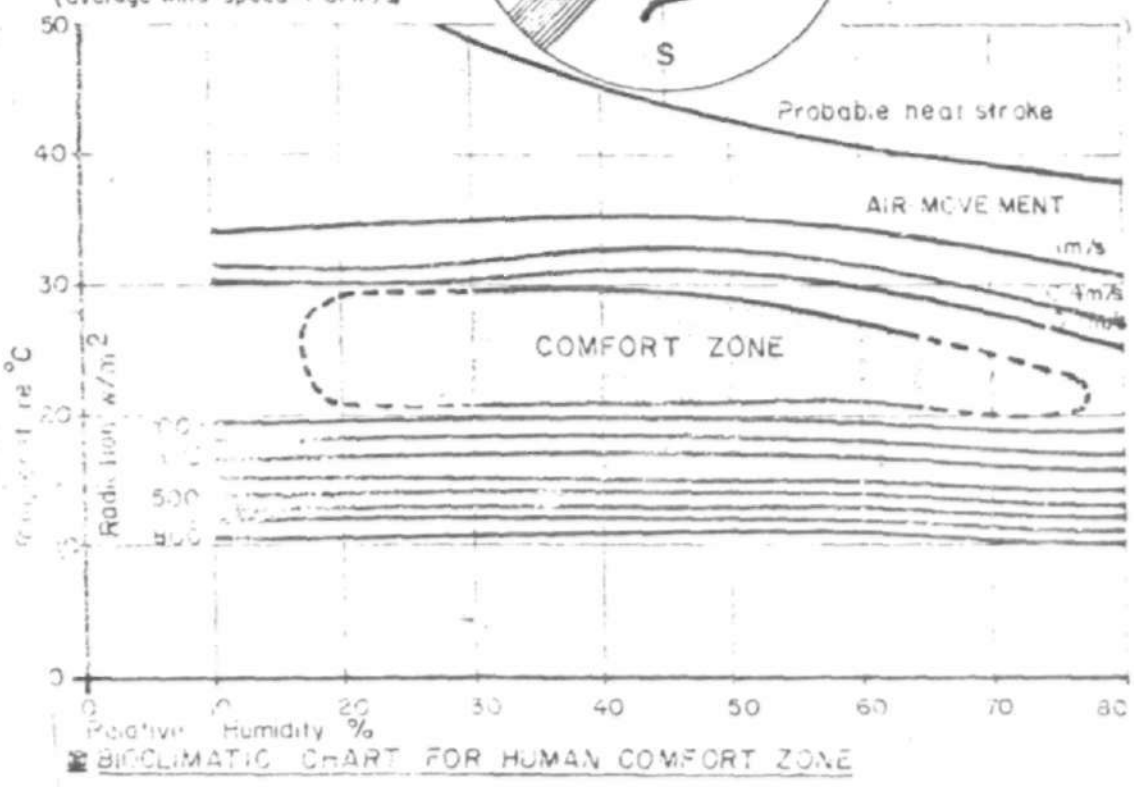
Zaria possesses a tropical continental climate and is located at a height of about 670.5 metres above main sea level, 640kms away from sea, in the centre of Northern Nigeria, with a latitude 11°10'N and longitude 7°38'E. Daily main maximum temperature goes to it's peak in April and the minimum occurs in December - January. Zaria enjoys a tropical savanna climatic region with dry season practically rainless and wet season with high sun. The main annual total rainfall is about 1099.3mm. This seasonal rainfall adds colour to the vegetation changing them from brown pale or yeloow in the dry season to green in the wet season.

Two different types of air masses pass through Zaria one from the North (mostly dry) and continent in origin (the Sahara Airmass) and the other from over the Atlantic in the South; mostly cool and equatorial maritime in nature. The movement of these air masses from North and South are actually responsible for changing the seasons. These boundary zones of air masses are following the world meteorological organisation terminology known as Inter-Tropical Discontinuity (I.T.D.). The surface position of I.T.D. runs North/South across the Country. These are approximately from WNW to ESE and its advancement is in the form of an oscillatory movement. Broadly there are following four seasons in Zaria (fig.5.2)

(a) Dry season (winter-harmattan period) November-February
(b) Hot Season March - April
(c) Thunder storms and squalls May - June
(d) Wet Season July - October

■PREVAILING WIND DIRECTION & AVERAGE WIND SPEED, AT *SAMARU*





■ BIOCLIMATIC CHART FOR HUMAN COMFORT ZONE

Fig 5·2



■ ANNUAL AVERAGE CLIMATIC CONDITIONS & CORRESPONDING SEASONS AT *SAMARU*



5.40 CLIMATE DESIGN - PERFORMANCE SPECIFICATIONS

The following factors will influence the design of building on the New Ahmadu Bello University Teaching Hospital site in Shika.

(a) Layout - The orientation of the buildings should be facing north and south with the long axis east - west.

(b) Spacing - Open spacing will be necessary for breeze penetration but with some screening protections from the prevailling SW-NE winds. Buildings should be moderately compact and low rise. Courtyards development would be suitable. The courtyards could be reasonably large.

(c) Air Movement Rooms can be double-banked, but there should be suitable provision for adjusting air flow across the building.

(d) Openings Window and door openings should be in the north and south walls, at body height on the windward sides, similar openings should also be provided in the corresponding internal walls. No openings should be allowed in the west walls. The total area for extendl openings should be approximately 15 to 25 percent of the total wall area.

(e) Protection of Openings Openings should be designed to exclude direct sunlight and to provide protection from driving rain.

(f) Walls and Floors Both external and internal walls and any intermediate floors should be of heavy construction with an insulation time-lag exceeding 8 hours.

(g) Roofs Roofs should also be of heavy construction with a time-lag which must exceed 8 hours.

(h) External Features Space for out door resting and sleeping would be desirable and adequate provision must be made for rainwater drainage. The use of verandas, covered passages and roofed-over spaces would also be appropriate.

(i) Mechanical controls Natural methods of ventilation would be sufficient for most of the year and the use of air conditioning would be confined to the height of the warm-humid season, i.e. July and August. Air conditioning design should incorporate realistic design temperatures, i.e. not over-air conditions.

5.50 SITE ANALYSIS

5.41 Location

The site is located along the South-West of the Zaria Funtua road, to the south-east of the site is the New Ahmadu Bello University teaching hospital. Further down the south - west of the site is the students hostel and to the north -west farmlands, this can be seen in figure 5.3,5.4 and 5.5.

Access

The major access to the site is the south-west funtua Zaria road, Due to the busy nature of the road, direct access from it to the site is not advisable, rather direct access should be taken from the untarred road to the south-west and north west of the site. This however, calls for proper grading and surfacing of the road.

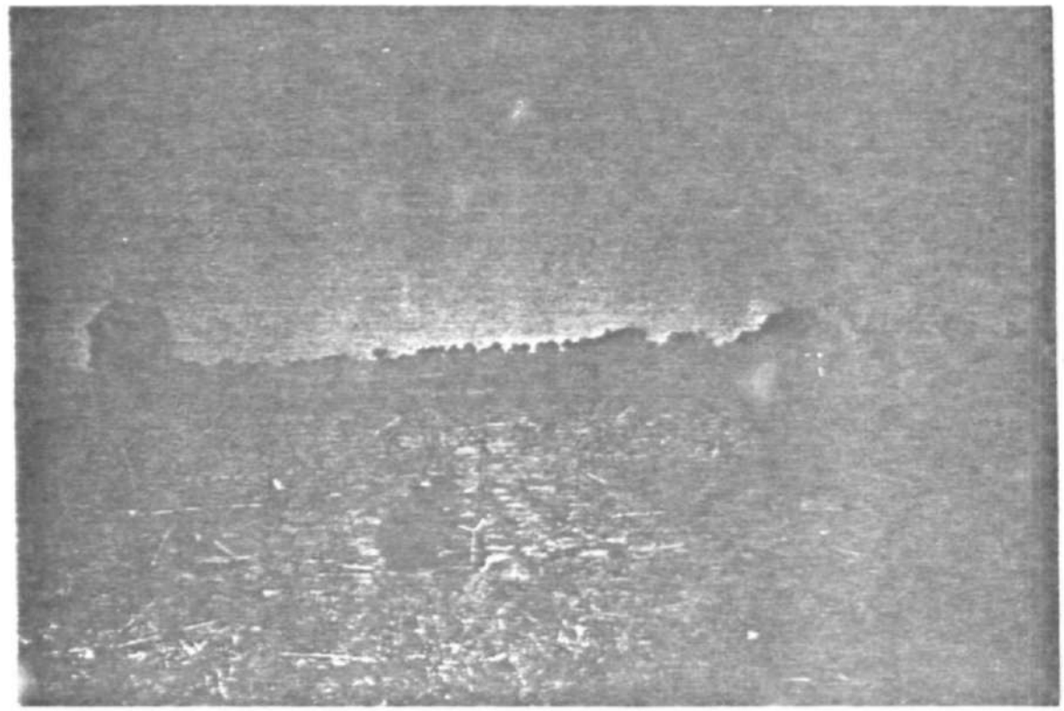


Fig 5.3

THE SITE FOR THE NEW SCHOOL OF DENTISTRY NEW A.B.U TEACHING HOSPITAL SHIKA ZARIA

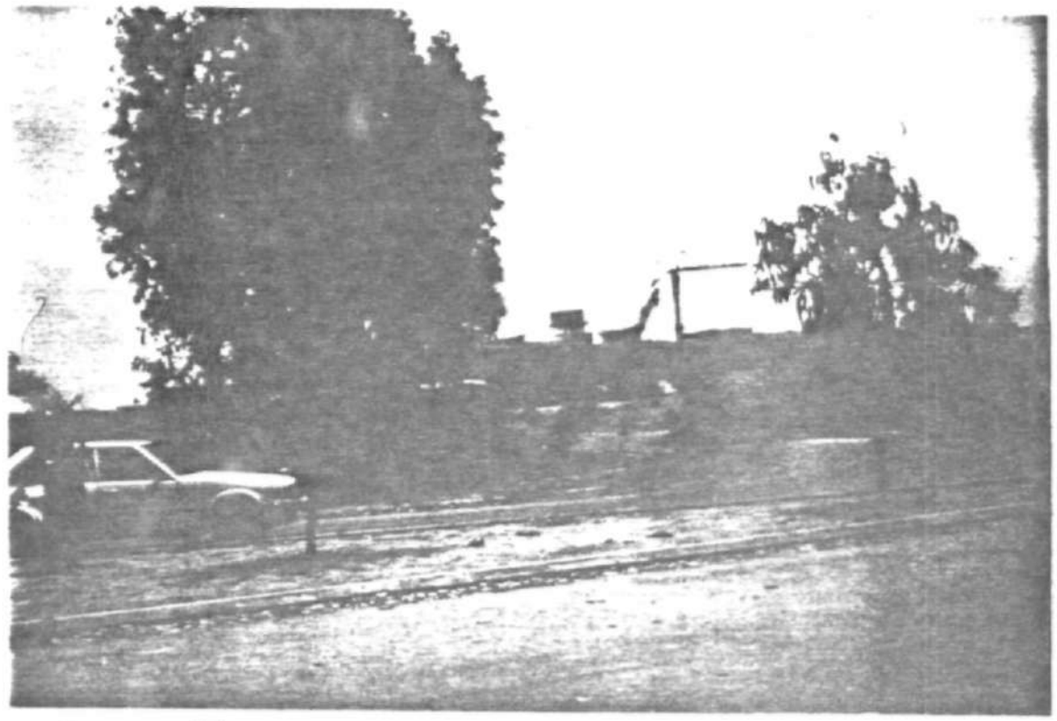


FIG. 5.4
& THE TEACHING HOSPITAL ON THE NORTH WEST BOUNDRY

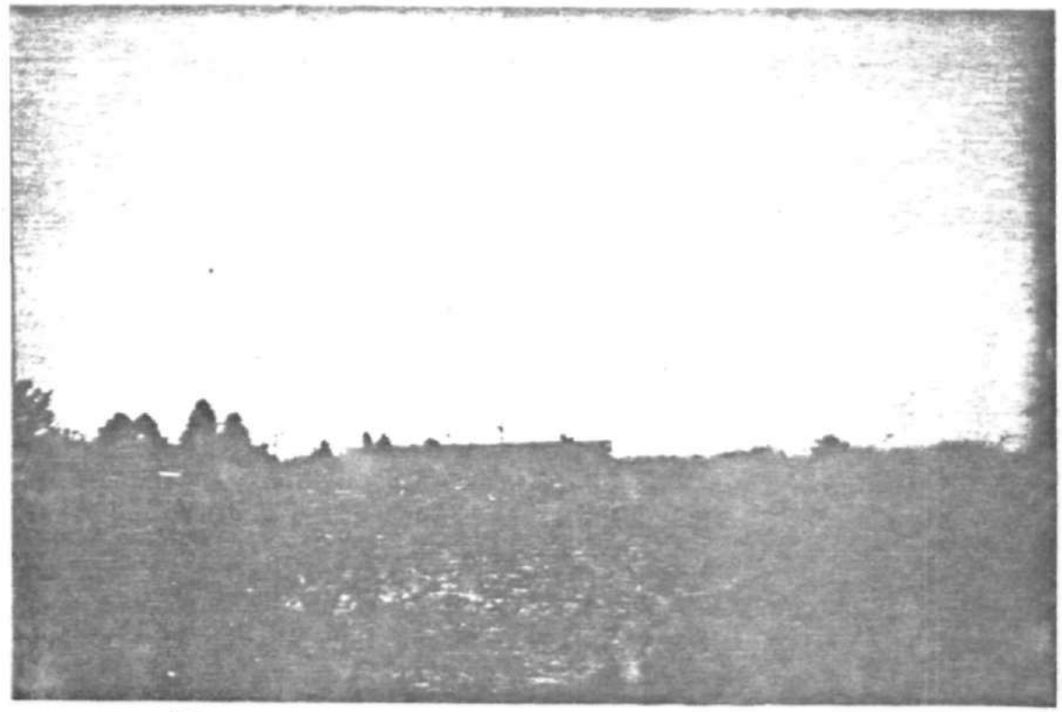


FIG. 5.5
THE HOSTEL ON THE NORTH EAST BOUNDRY.

Topography and Expantion

The site is almost flat with a slight fall of the land towards north west. The required site can be expanded towards the south west and south east of the site.

Trees

Not many trees exist on the site as can be seen from figure where these do not obstruct building construction they should be retained. More trees need to be planted to act as noise brakers, sun brakers etc.

Services

The services such as sewage, water, electricity, telephone and gas can easily be tapped from the existing teaching hospital services.

Nuisance

The only off site nuisance envisaged is noise from vehicular traffic plying the south - west Zaria funtua road. Noise brkaers in form of trees and shrubs are needed and proper zoning can also help.

Footnotes

1. De Chiana J. and Koppelman L.E
   Site Planning Standards
2. Hardy, O. B. and Planners L.P
   "Hospitals the Planning and Design Process
   (Aspen systems corporation, Germantown,
   Maryland, 1977)
3. Department of Urban and Regional Planning
   A.B.U. Zaria, Zaria Master plan 2000.

CHAPTER 6

THE DESIGN

6.10 AIMS AND OBJECTIVES

To design a school of dentistry at the New Ahmadu Bello University teaching hospital Shika with an initial intake of 20 students per session which may increase to 30 students that:

- meets the immediate need of the population to be served;
- will redress the imbalance between the norther and southern parts of the country;
- will critically analyse the possibilities of solving many problems which are posed by technical and climatic difficulties in Zaria by using a pavillion type of building;
- has a flexable design to enable the university construct the new school in various stages according to priorities;
- has the ground floor designated mainly for patients while the upper floor is reserved exclusively for staff members and students.

6.20 SCOPE OF THESIS

The scope of this thesis can be broadly divided into three main parts. The first part is the planning which includes the zoning of the different departments according to their functional relationship.

The second component of the scope is the architectural sketch design of the school components. The school of dentistry is to consist of the following departments:

(a) Administration

(b) Reception of patients, record store and dispensary.

(c) Diagnostic clinic
(d) Department of oral surgery and oral medicine
(e) Department of preventive medicine social dentistry and periodontology
(f) Department of Conservation, Proslhetics and Pedontics.
(g) Department of oral pathology and Biology
(h) Students training unit
(i) Ancillary facilities.

The third component of the scope is working drawing. To show that the design can be constructed, I picked a part of the complex, the conservative clinic with the academic unit and did working drawing of that area.

6.30 DESIGN CONCEPT

6.31 Types of Layouts

In designing a dental school the clinics are the most important and dominant feature. It is similar to a hospital design where adequate ventilation is of ultmost important. There are two basic types of hospital plan, the pavillion type and the high rise type. Pavillion type is proposed for this school of dentistry because of the following reasons:

i. It brings the patients nearer to nature and it harmonises easily with the architecture of the area where the hospital is to be built.
ii. The building can be phased into different stages either to meet the immediate needs or to follow the financial ability of the sponsor.
iii. Mechanical parts of buildings tend to age faster than the main structure.

Therefore low-rise buildings (especially one-storey buildings) tend to have longer life span than than high rise types.

There are three types of pavillion type hospitals.

(a) The Linear plan

In this plan, buildings are placed along a central corridor with the buildings at right angle to it on both sides. It is suitable for most climates except where winds cause tunnel effect between the buildings. Among it's advantages are

- It's adoptability to most sites,
- Efficiency of circulation of people and services,
- It's capacity for variation (flexibility),
- And expansion through standardized building methods.

The main disadvantages of this type of plan is that it can cause drainage pockets between buildings.

(b) The Rectinear Plan

The most common example of this type of plan is the gridtron which consist of separate rectangular blocks so positioned as to form a chequer board of buildings and open spaces with circulation along the coordinates of the grid.

This type of plan too is suitable for most climates, though some buildings may face east and west, it has well-protected outside spaces and it can accommodate moderate slopes in any direction by using ramps along the circulation routes. Circulation is flexible though extended and some times confusing. Addition of new units is quite easy but extension of existing ones is difficult. Repetitive nature helps standardized building methods. This method creates different courtyards

which can be landscaped differently to suite their functions.

(c) The Dispersed plan

This type is generally referred to as the pavillion type. It has been used extensively in the past because land was not scarece. It is suitable for most climate, but it's circulation routes maybe too long and unpleasant during rain-storms and heavy winds. Since the buildings are scattered, the plan can be made to follow contors, to avoid obstacles and to allow for expansion. It is possible to achieve maximum economy by repeating identical blocks or by phasing. The plan has the disadvantage of having undefined outside spaces.

6.32 PLANNING CONCEPT USED IN THE LAYOUT

In laying out the school of dentistry, I intended to achieve the shortest distances between the various components of the school and to achieve proper zoning of the school into public (patients) and non-public (for lectures and students) see (figure 6.1) I also intend using the semi quiet zone (the clinics) to bufer noise from the noisy zone ancillary so that it does not get to the quiet zone (wards and operating theatres). In this processes, I came up with the chequer board layout form. Hexagons has been used to shortened the corridors and still have adequate ventilation.

Apart from these basic concept regarding the layout, others considered include bringing areas that have similar or need similar services together. The functional relationship diagram can be seen in figures 6.2 and 6.3.

6.4 SCHEDULE OF ACCOMMODATION

1. ADMINISTRATION

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA (M^2)
Entrance Lobby			
Dean's Office	1	25	25
Office of Dean's Secretary	1	20	20
Waiting Area			
Finance Officer	1	20	20
Administrative Officer	1	20	20
Multi-purpose office	1	15	15
General Office	1	60	60
Staff Meeting Room	1	80	80
Store Room	1	10	10
W.C. for Male and Female			

2. RECEPTION OF PATIENTS, RECORD STORE AND PHARMACY

ROOMS	NO OF ROOMS	AREA OF EACH (M^2)	TOTAL AREA(M^2)
Entrance lobby and Reception area			
Temp record store for patient	1	30	
Files under treatment			
Central Record store	2		250
Waiting Area for 150 persons		150	150
Dispensary with store and small office	1	80	80
W.C. for male and female patients			

3. DIAGNOSTIC CLINIC

ROOMS	NO OF ROOMS	AREA OF EACH (m^2)	TOTAL AREA (M^2)
Waiting Area			
Diagnostic room with 6 Dental chairs	1	120	120
Emergency Room	1	40	40
Trolley bay	1	25	25
Demonstration room with two dental chairs	2	40	80
Offices for sisters	2	20	40
Rest room for sisters	1	25	25
Store room	1	15	15
W.C. for male and female staff			
Central Diagnostic Radiology	1	120	120

4. DEPARTMENTAL OF ORAL SURGERY AND ORAL MEDICINE

ACADEMIC UNIT

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
Office for Professor	1	30	30
Office for Professor's Secretary	1	20	20
Central Office	1	30	30
Staff meeting room	1	60	60
Office for Reader	1	20	20
Offices for senior Lecturers	2	15	30
Office for three lecturers	1	40	40
Store room	1	10	10
W.C. for male and female staff			

CLINICS AND ONE WARD

CLINICAL UNIT

(A) Extraction Clinic (Local Anaesthesia)

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
Demonstration Room with 7 Dental chairs	1	130	130
Room for local anaesthesia	1	25	25
Consultation rooms with 1 dental chair	2	25	50
Recovery room for 3 beds	1	30	30
Diagnostic laboratory plus store	1	60	60
(B) Extraction clinic (General Anaesthesia)			
Demonstration rooms with 1 dental chair	2	20	40
Room for anaesthesia	1	15	15
Consultation room with 2 dental chairs	1	50	50
Recovery room for 3 beds	1	25	25
Central sterilization unit plus stores	1	150	150
Operating theatre with 2 tables	1	60	60
Room for anaesthesia	1	20	20
Scrub-up room	1	10	10
store	1	10	10
Room for disposal	1	20	20
Seminar room for 30 students	1	50	50
Rest room for Doctors/Nurses	2	15	30
W.C. for male and female staff			
(C) Ward for 65 Patients			
Ward for 30 male patients(beds)	1	270	270
Toilet with 3 W.Cs. and hand wash basins	1	15	15
Washroom with 8 handwash basins	1	25	25

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
2 showers and 2 bathtubs			
Kitchen	1	15	15
Workroom for Nurses	1	25	25
Room for Ancillary Medical staff	1	20	20
Store rooms	2	10	20
Private rooms with W.C. and showers	2	20	40
(D) Ward for 15 Children beds			140
Toilet with 2 W.C. and handwash basins	1	12	12
Washroom with 4 handwashbasins 1 shower and 1 bathtub	1	18	18
Kitchen	1	15	15
Workroom for Nurses	1	25	25
Room for Ancillary Medical Staff	1	20	20
Store rooms	2	10	20
Private rooms with W.C. and shower	2	20	40
Room for Matron of Ward	1	25	25

5. DEPARTMENT OF PREVENTIVE MEDICINE, SOCIAL DENTISTRY AND PERIODONTOLOGY

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
ACADEMIC UNIT			
Office for Professor	1	30	30
Office for Professor's Secretary	1	20	20
General Office	1	30	30
Staff meeting room	1	60	60
Laboratory	1	60	60

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
Office for Reader	1	20	20
Office for Senior Lecturers	2	15	30
Office for three lecturers	1	30	30
Store room	1	15	15
W.C. for male and female staff			
CLINICAL UNITS			
(A) Periodontology			
Waiting Area		12	12
Demonstration room with 10 Dental chairs	1	140	140
Therapist room 6 dental chairs	1	90	90
Sterilization room	1	12	12
Staff Room	1	20	20
Seminar Room for 30 students	1	50	50
(B) Orthodontic Clinic			
Demonstration room with 4 dental chairs	2	60	120
Sterilization unit	1	15	15
Laboratory	1	60	60
Staff rooms	2	15	30
W.C. for male and female patients			

6 DEPARTMENT OF CONSERVATION, PROSTHETICS AND PEDODONTICS

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
Office for Professor with toilet	1	30	30
Office for Professor's Secretary	1	20	20
General Office	1	30	30
Staff meeting room	1	60	60
Laboratory	1	60	60

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
Office for Reader	1	20	20
Office for Senior Lecturers	2	15	30
Office for three Lecturers	1	30	30
Store room	1	15	15
W.C. for male and female staff			
CLINICAL UNITS			
A. Conservation clinic			
Waiting Area	1	20	20
Conservation room with 24 dental chairs	1	280	280
Sterilization unit	1	12	12
Demonstration room with 2 dental chairs	1	30	30
Conservation technique laboratory	1	70	70
Radiology room	1	35	35
Room for staff	2	15	30
B. Prosthetic Clinic			
Waiting Area	1	18	18
Prosthetic room with 18 dental chairs	1	210	210
Demonstration room with 2 dental chairs	1	30	30
Sterilization room	1	15	15
Material laboratory with store	1	70	70
Prosthetics teaching laboratory	1	150	150
Polishing, Processing and plaster casting room	1	120	120
Preparation room with store	1	80	80
Staff rooms	3	15	45
Seminar room for 30 students	1	50	50

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
C. Pedodontic Clinic			
Waiting Area	1	15	15
Pedodontic room with 12 dental chairs	1	140	140
Demonstration room with 2 dental chairs	1	30	30
Pedodontic laboratory plus 1 store	1	60	60
Sterilization room	1	15	15
staff rooms	2	15	30

7. DEPARTMENT OF PATHOLOGY AND BIOLOGY

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
ACADEMIC UNIT	1	30	30
Office for Professor with toilet	1	20	20
Office for Professor's Secretary	1	30	30
General Office	1	30	30
Staff meeting room	1	60	60
Laboratory	1	60	60
Office for reader	1	20	20
Office for Senior Lecturers	2	15	30
Office for three Lecturers	1	30	30
Store room	1	15	15
W.C. for male and female staff			
CLINICAL UNITS			
A. Pathology			
Laboratory	1	120	120
Store rooms	2	10	20
Staff rooms	1	15	15

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
B. BIOLOGY			
Demonstration and lecture room for 30 students	1	60	60
Exibition room	1	50	50
Store room	1	20	20
Staff Room	1	15	15

8. STUDENTS TRAINING UNIT

ROOMS	NO OF ROOMS	AREA OF EACH(M^2)	TOTAL AREA(M^2)
Lecture Theatre	1	120	120
Audio-Visual Leboratory	1	50	50
Store room	1	20	20
Phantom room	1	160	160
Staff room	1	15	15
Multi-disciplinary teaching and research laboratory	1	250	250
Staff rooms	2	15	30
Store room	1	10	10
W.C. for male and female students			
Library, Book-store for about 10,000 volums partly open access	1	300	300
Reading area with information desk, catalogue, periodicals, display and reference books	1	180	180
Office for Librarian	1	20	20
Office for Librarian's Secretary	1	15	15
General Office	1	25	25
Multi-purpose room	1	25	25
W.C. for male and female staff			

9. COMMON FACILITIES

ROOMS	NO OF ROOMS	AREA OF EACH(M2)	TOTAL AREA(M2)
Senior Staff common room	1	40	40
Rest room for Nurses	1	30	30
Rest room for junior Medical and Ancillary staff	1	50	50
Students common room	1	60	60
Male locker room with W.C. and Showers	1	40	40
Female locker room with W.C. and Showers	1	60	60

10. ANCILLARY FACILITIES

ROOMS	NO OF ROOMS	AREA OF EACH(M2)	TOTAL AREA(M2)
Maintenance Workshop for building		80	80
Engineering Workshop for Medical equipments		100	100
Engineers and Technicians rooms	3	15	45
Central store		400	400
Generator room	2	80	160
W.C. and Showers for staff		40	40

The height of the building(s) is restricted to two floors (Ground and First Floor). This can be used for the distinction of the public area for patients and their treatment (Ground Floor), and the private area i.e. Staff and Rest Rooms, Laboratories, Student Training Unit and Administration. Circulation space is already partly included in the areas given above, but an additional 10 to 15 per cent of the total floor area can be used for W.C.'s and corridors. The open spaces between the various buildings must be properly landscaped. The design of the new school demands a great deal of imagination and talent from the architect.

6.50 DESIGN REPORT

6.51 Design Consideration

The design has been done with the following following considerations in mind:

(a) Environmental considerations

(b) Planning considerations

(A) Environmental Considerations

(i) Noise reduction: As much as possible, noisy areas have been separated from quiet areas, Hence the in-patient wards have been moved away from the very noisy clinics and engineering services.

(ii) Wind and rain: During the rainy season, this becomes critical. The design has therefore been aimed at blocking out rain. The finished ground floor level is slightly elevated above the ordinary windows to keep out rain falling at an angle; and adequate drainage has been incorporated to follow the site configuration.

(iii) Thermal Comfort: Thermal comfort within the built environment has been achieved through orientation of the buildings for maximum cross-ventilation, overhangs to cut off direct sun penetration which causes glave; adequate landscaping to give a cooler micro-climate.

(B) Planning Considerations

(i) The provision of space for addition of new nits has been considered.

(ii) Adequate zoning of the different departmental areas so that mutually beneficial departments are contigious to each other.

(iii) Keeping the whole school in an integrated complex to reduce travel distance and the distance of service runs.

(iv) Separation of the different levels of traffic within the school i.e. patients, personnel and students.

(v) Ease of communication: This has been achieved by the use of the spine principle of hospital streets to which different departments have been tired.

(vi) Parking : Planning was aimed at providing enough parking space for patients, staff, students, visitors and service vehicles. Separate parking has been provided for the students close to the students' training unit.

(vii) Landscaping: Landscaping has been done to achieve proper integration of the different elements of the design; obstruction of noise from traffic and engineering services; blocking off of unwanted sights; creating cooler internal environment by shielding buildings from afternoon sun; shielding from angular rain and wind; and aesthetics.

The Design

The individual departments are arranged in a chess-board pattern to give internal courtyards. Courtyards which further help in the lighting and ventilation of the rooms within each department. A hexagonal shape has been chosen and this is repeated for each department. the 45^{o} sides help in bringing the units closer to help reduce long corridor and still have adequate lighting and ventilation.

Entrance: Separate entrances have been provided to ease traffic flow. Patients entering the school are immediately faced with three entrances i.e. the general entrance, the general out patient entrance and to the right is the entrance to the emergency and diagnostic clinic.

Construction: The building frame is of rainforced concrete columns and beams in the main school complex. In the engineering services area, it is of reinforced concrete and steel. Interior partitions in the clinics is of plaster board and external cladding is of fibre cement sheets mounted on aluminium framing, and of mansonry infill walls.

Windows areas are clearly demacated in bands of glazing, to make room for maximum internal flexibility.

Internal wall finishes are brihtly coloured paint on plaster.

Floor finishes differ according to the departments, ranging from conductive terrazzo in the operating theatre to quarry files and cement screed in the heavy traffic areas.

Footnotes

1. De Chiara J. and Callendar H.J. (1980) Time Saver Standards for Building Types MC Graw - Hill Book Company, New York.

2. Neufert E. (1980) Architect's Data Granada Publishing Limited, London.

3. Tutt P. and Adler D. (1979) New Metric Handbook Architectural Press Limited, London.

BIBIIOGRAPHY

1. Neufer E.....Architect's Data
Granada Publishing Ltd.,
Great Britain. (1980)

2. Architectural Record
Dental Schools, College,
U.S. Portland University of
Oregon.(1978)

3. Architectural Record
Dental Clinics U.S.
Wood Stock N.Y. Kretenberg
(1980)

4. Domus..... Dental Clinic G.B. London
Ealling.
(1978)

5. Japan Architecture
Dental Schools,
Colleges,
Japan Nigata, Nippon.
(1975)

6. Alfred M.K..... Architectural Handbook
John Wiley Sons Inc. U.S.A.
(1979)

7. Alison S. ..... General Hospital,
Ikorodu Unpublished M.Sc.(Arch)
Thesis, Ahmadu Bello University,
Zaria.
(1974)

8. De Chiara J. and Koppelmen L.E.
Site Planning Standards
Mc Graw-Hill Book Company
New York.
(1978)

9. De Chiara J and Callender J.H.
Time-Saver Standards for Building
Types: McGraw-Hill Book Company,
New York.(1980)

10. Wheeler T.E.
Hospital Design and Function
McGraw-Hill Book Company
New York.
(1964)

11. William E.G.
Radiological Safety in Medical
Facilities.
(1959).

12. Rosenfield ..... Hospital, Architecture
and Beyond Van Mostrand Reinhold Company
New York.(1969)