

epidiascope

diploma project

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industrial design centre

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L. I. T. Bombay.

Design of Epidiascope

Diploma project

Submitted in partial fulfilment of the
requirements for the postgraduate diploma
in Industrial Design

by

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Industrial Design Centre
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Bombay

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Approval sheet

Diploma project entitled "Design of Epidiascope" by Ramachandran Kadiru is approved for the postgraduate diploma in Industrial Design.

Guide

Chairman

Examiners

Myds

Agropus with Rm.

My acknowledgements to

Various educational institutions in Bombay.

Staff of Industrial Design Centre.

Shri M. Chattopadhyay.

Dr. Vasavraju, Physics Department, IIT Bombay.

Shri P. Prabhakaran

and

My friends.

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PROBLEM STATEMENT

To design an epidiascope to be used by schools

INTRODUCTION

We learn mostly through our eyes and approximate contribution of sensory organs are given below:

1% through taste

2% through touch

4% through smell

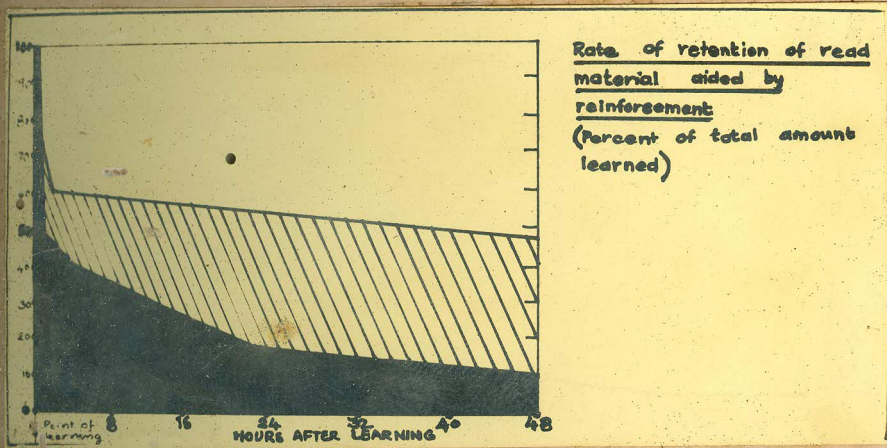
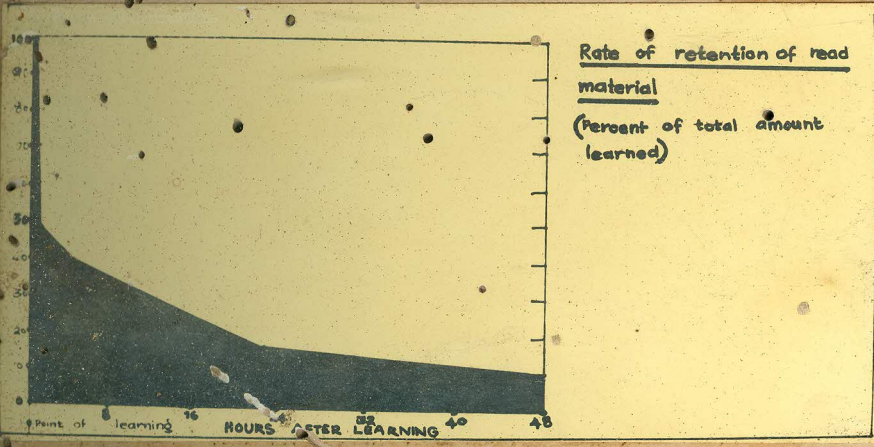
10% through hearing

83% through sight

This reveals that learning through sight so much overshadows learning through any and all other senses that no adjustment for error or incidents of exception could lessen the impact of sight on the process of learning. So it is vision that is the main avenue of perception, the eyes carry the burden of learning.

How much do we retain?

The figure on the left hand side gives the rate of retention of read material. In the second figure the reinforcement refers to a relearning of original learning in which the student spends additional time. The result is that the student's rate of retention was raised to about 50%. But if the conceptual reinforcement was accomplished by the addition of visuals rather than by the repetition of reading, the retention rate of 50% could



be very well be more than coincidental.

We do not think in words, our mind thinks in pictures. To communicate facts, figures and ideas, visual presentation is more effective.

PROBLEM BACKGROUND

Audiovisual aids have very great influence in teaching. The student grasps more fast and retention of the subject is also more. The result of the research conducted by some psychologists show that audiovisual aid is a must particularly for the educational purpose to reinforce the retention of the subjects taught in the class.

Indian schools have realised the importance of visual aids recently only. But in the near future the usage of visual aids are going to be more as it is seen from present condition. Taking into consideration of the present Indian condition epidiascope has got more influence in teaching than any other communicating media for visual display. This is because preparing slides is a money and time consuming process which most of the schools cannot do.

In overhead projectors we are either projecting slides or some written matters simultaneously as the teacher writes on the transparent acetate paper. But one of the main problems the teachers are facing, is that most of the

you can always trace figs

teachers who are not good at drawing find it difficult to communicate through drawings. As a result the real experience of a subject taught is not shared by the students. So in the present Indian condition of schools, epidiascopes are more useful than other audio-visual aids, even though there are some disadvantages in epidiascope over other visual aids.

INFORMATION FROM DEALER

1. The dealer is selling two epidiascopes of similar arrangement but of different make.
2. The selling cost is Rs.1750/-
With pointer attachment the extra charge is Rs.80/-.
Six per cent tax is also charged.
3. The manufacturer is Labo and Osaw.
4. The selling rate is one epidiascope in six months in one shop.
5. The customer is not left with choice because they have either epidiascope or slide projection and not episcope.
6. Mostly educational institutions buy epidiascopes.
7. The dealer is not selling spare parts of epidiascopes.
8. So far they have not received any complaint from customer.

GENERAL INFORMATION FROM SCHOOLS AND COLLEGES

1. Majority of the schools and colleges have got special auditoriums or special rooms for visual display.
2. All the teachers, I have met, like to have some audiovisual aid to make teaching more efficient and easy.
3. All the teachers say that the students will welcome this audio-visual equipments. But few teachers say that controlling the classes in the darkness is not efficient.
4. All the teachers say that they consume more time to draw figures on the black board.
5. All the schools having epidiascopes are having slide projectors also.
6. Majority of the school teachers say that is very difficult to get the slides on various subject they teach.
7. Most of the schools and colleges can afford to pay Rs.2000/- to buy such an instrument.
8. Audiovisual equipments will create interest among students. All teachers admits to this fact.

INFORMATION FROM STUDENTS

1. All the students say that their teachers is not good at drawing and they ask students who are good at drawing to draw the figures for them.
2. This consumes a lot of time because the teacher has to wait for the student, who draws the figures for him, till the student completes in his note book.
3. Some of the teachers ask the students to refer to text books for figures.
4. Students say that they can understand better if they see the figure or photographs.
5. Students always like to see coloured photographs of figures.
6. Many of the students have got no atlas. Especially teachers finds it difficult to draw maps on the board.

DATA AVAILABLE ON THE PROBLEMS OF EPIDIASCOPES
FROM CONSUMER (EDUCATIONAL INSTITUTIONS)

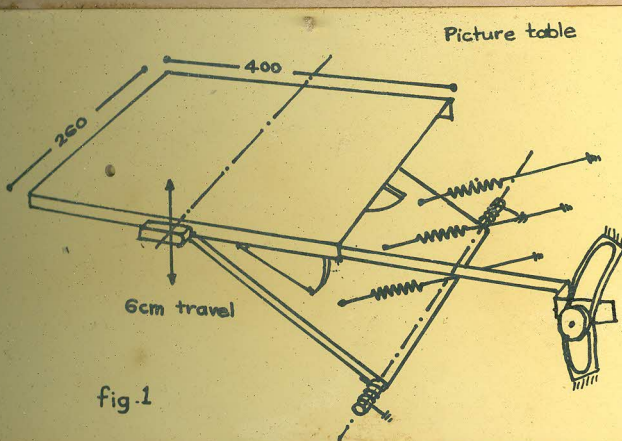
1. Out of eight institutions, teachers operate the instrument in five institutions.
2. Most of the institutions project books, charts and photographs.
3. Maximum time of projecting one figure on the screen is known to be two to three minutes.
4. Many of the teachers say that picture table is not sufficient to hold their papers.
5. Another main complaint is that focusing get disturbed after some time.
6. The photographs get warped after some time of operation due to heat.

ANALYSIS .

1. STRUCTURAL ANALYSIS

1.1 Picture table and heat proof transparent glass plate:

This consists of a flat table of sheet metal of 40 cm x 26 cm size (16 gauge) fitted to the



linkage as shown in figure 1 to keep the picture table pressed against the top glass plate. There is a locking device also for the table. A

A small plastic handle is also provided to bring the picture table down. A black felt is glued to the top of the picture table.

Process:

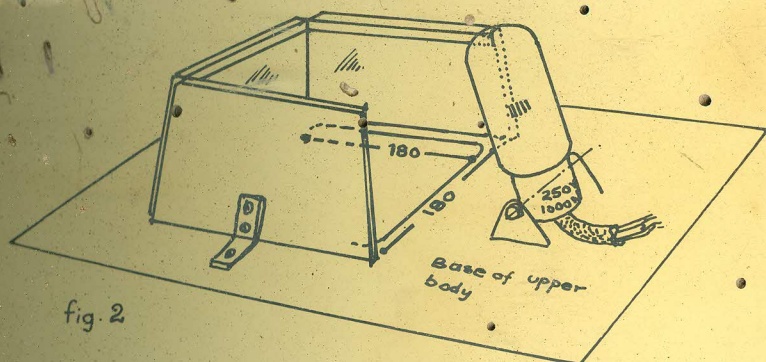
Member A is a pressing in sheet metal.

Member B is a casting.

1.2 Mirrors around the transparent glass:

The three mirrors slightly inclined towards the heat proof transparent glass. The heat proof glass is of the same size as the picture table. The mirrors are placed in such a way as shown in figure 2.

OG/Proj/Ram(2)



The plane glass mirrors are fixed on sheet metal holders which is again fitted to the upper body.

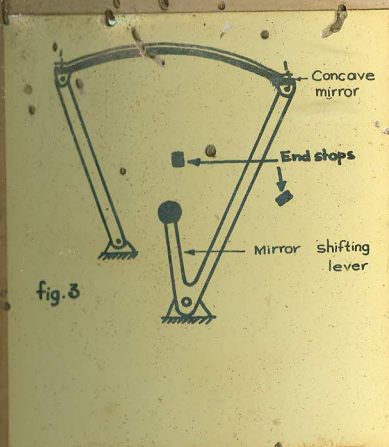
Process:

Mirror holders are pressed after placing the mirror.

1.3 Projection lamp and holder:

The different types of projection lamps available for epidiascopes are 500 W, 1000 W and 1500 W. In this make, it is a 1000 W lamp. The lamp is screwed to the holder. The holder can be tilted along with the lamp and fixed at any inclination to the transparent glass plate using the knob provided. This lamp holder unit is resting on a platform which is fitted at the bottom of the upper body. The lamp holder unit can be slid and fixed at any point in the direction of lens axis. This is shown in photograph 1.





1.4 . Concave mirror for projection lamp:

This is a concave mirror of aluminium of 18.8 cm dia fitted on to a linkage mechanism as shown in figure 3. There is a handle provided outside the epidiascope to shift the mirror as per requirement of slide projection or epi-projection. There are two stoppers to limit the travel of the mirror.

Process:

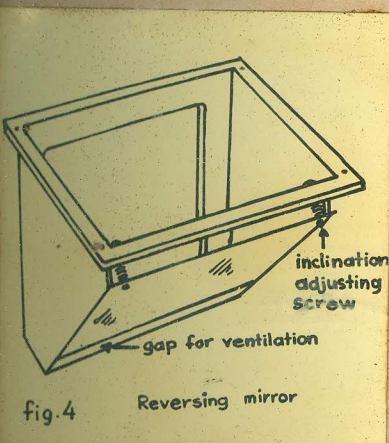
The mirror is die cast.

1.5 Reversing mirror:

This is a silvered plane glass plate of size 13 x 18.5 cms held at 45° to the lens axis to reflect the rays to the top lens system. (for epiprojection). This is held to the upper body by a cast iron structure. There are screws and spring arrangement at the top of the structure to correct the inclination of the above mirror to lens axis, if required. This is shown in figure 4.

Process:

Mirror is pressed inside a sheet metal structure and metal structure is in turn screwed to the cast iron structure.





1.6 .Lens and focusing system for epiprojection:

This is a hollow metal barrel where the lens system is accommodated. For focusing rack and pinion as shown in figure 5 is used. This rack and pinion is operated using the knob provided outside the upper body (photo 2).

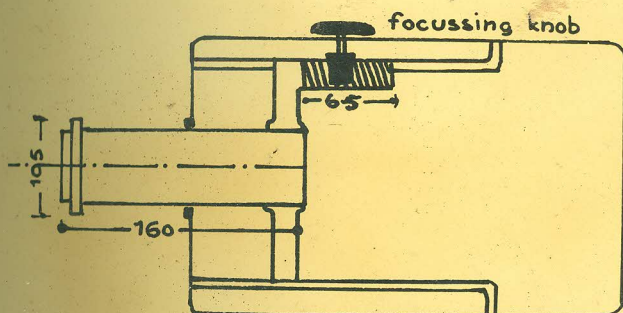
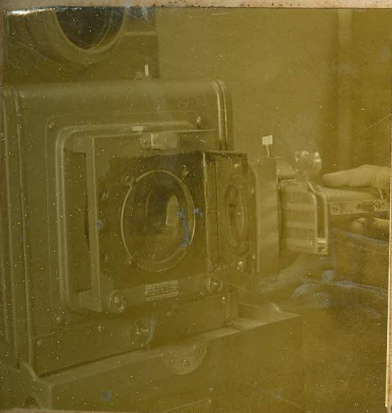


fig. 5

Plan

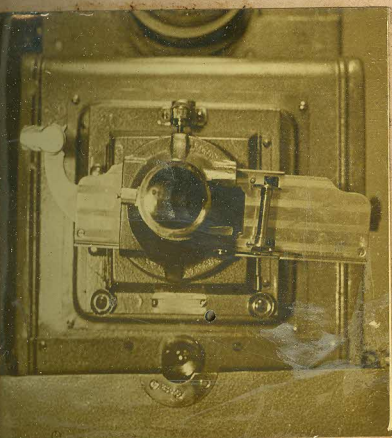
Process:

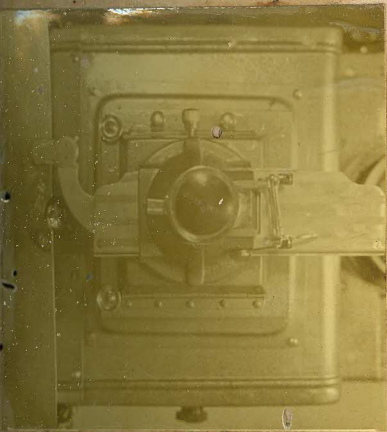
The barrel is a steel table turned inside and outside and lens are fitted inside using spacers.



1.7 Lens and focusing arrangement for slide projection:

This unit consists of a condenser, a light bluish plane transparent glass as heat filter and the compound lens system fitted in a cylinder using spacers. An arrangement for fixing slide holder unit is also provided. This unit is hinged to the main body so that it can be opened and lenses and the heat filter glass can be cleaned. (Photo 3) The unit consisting of slide holder and compound lens system can be tilted by 90° . This arrangements are shown in photographs 4 and 5 . The metal





cylinder holding the compound lens systems is threaded and the spring loaded key acts as a nut for this threaded lens holder (photo 6).

Process:

The main part is of cast iron. Slide holder is a pressing of aluminium alloy. The cylindrical lens holder is turned.



1.8 Upper body:

It is a sheet metal pressings joined together by welding. Ventilating holes as punched out in the sheet and made light tight. The upper body has got four wheels, which rolls over the lower body (Photo 7). There are end stops for this movement. All stationary units are fixed directly to the upper body. There are provisions on the upper body to accommodate the blowers, lens systems, focusing arrangement, shifting lever (for epiprojection or slide projection), switches and plugs (Photo 8).

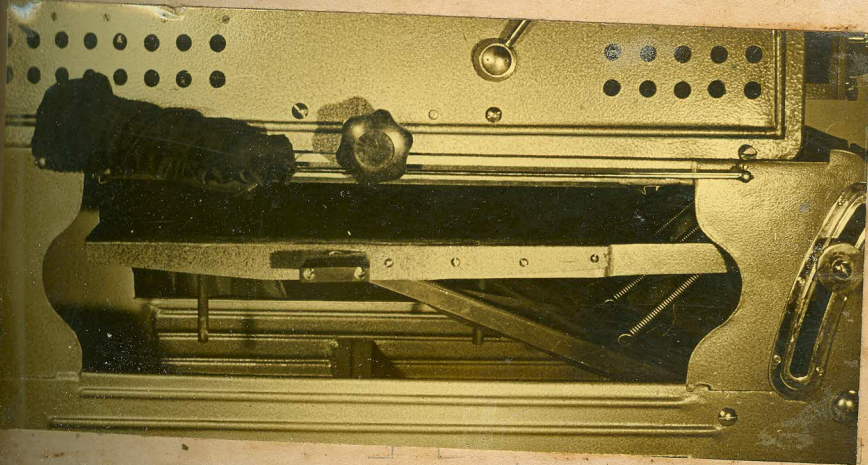


Process: .

Sheet metal pressings pressed, punched and welded.

1.9 Lower body: .

This is also a welded sheet metal work. The picture table, transparent heat proof glass plate are fitted to lower body. The raising arrangement is also fitted to the lower body.



There are end stops to restrict the motion of upper body over the lower body (Photo 9).

1.10 Cooling system:

Cooling system consists of two blowers. The blowers are driven by electric motors and the electrical connections done to a common switch. Shown in figure 6.

Process:

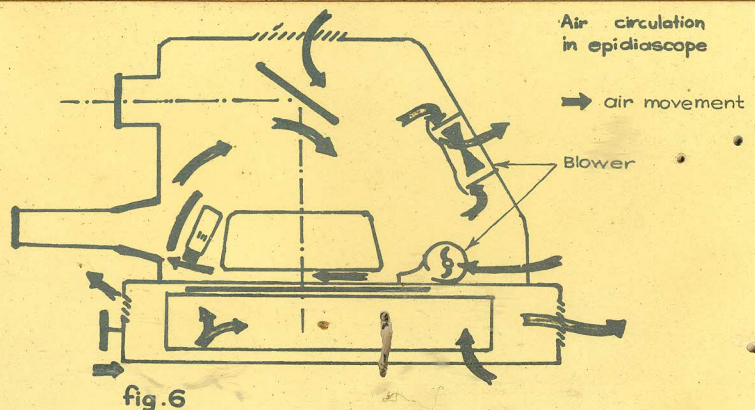
The blowers are of sheet metal work. The ventilating holes are punched.

1.11. Raising device:

This consists of two legs, in the front portion of lower body, which can be moved vertically using a set of gears, and ratchet and pinion. A knob is provided to operate this device. The knob is fitted to a worm and worm wheel. Worm wheel shaft is having two ratchets and pinion arrangement on either side of the worm wheel. These ratchets are connected to the two legs. Shown in figure 7.

1.12 Pointer attachment:

This is a steel wire which can move freely in the space between lower and upper bodies.

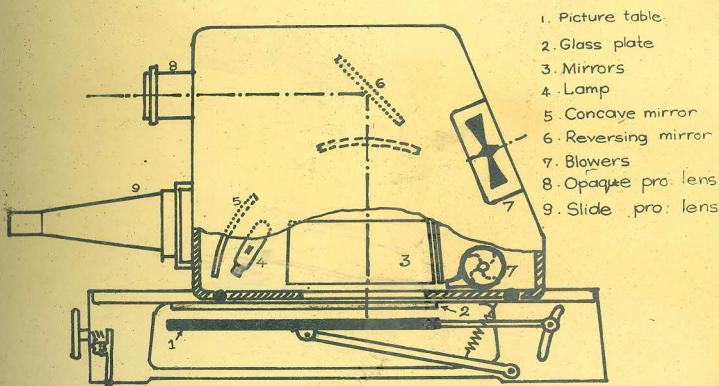


2. FUNCTIONAL

2.1 Picture table and heat proof transparent glass plate:

The picture table always moves towards the glass plate with its plane parallel to the heat proof glass plate. This is to have the same clearance on all sides between glass plate and picture table at a particular position for efficient operation. To achieve this, a four bar linkage is used. A locking device is provided to keep the picture table fixed at some required positions. The heat proof glass is

used to keep the books or papers pressed against it. Felt is glued to the picture table to avoid direct heating of picture table and to have a



fairly good surface for pressing the books.

Fig.8.

2.2 Mirrors around the transparent glass:

This is used to reflect all the rays towards the picture and thus increasing the illumi-

nation on the picture.

2.3 Projection lamp and holder:

This is to illuminate the picture kept on the picture table. Holder is meant for holding the projection lamp. Adjustments in positioning and the inclination of projection lamp to the vertical can be done, using the screws and knobs provided in this component, for satisfactory results.

2.4 Concave mirror for projection lamp:

This is to increase the illumination in both cases of projection (i.e. epiprojection and slide projection).

2.5 Reversing mirror:

This mirror turns reflected rays from the picture table by an angle of 90° towards the lens system and does the lateral correction for the image.

2.6 Lens and focusing system for episcopic projection:

The distance between screen and epidiascope is

not a constant in different rooms. So this has got a focusing system to have the flexibility to change the image distance.

2.7 Lens and focusing arrangement for slide projection:

A condenser system provided in this unit is to condense the rays and illuminate the transparency. A heat filter (light blue) is used to absorb heat of light rays coming from the condenser. The lens system with the metallic barrel is moved in or out, by rotating it, for focusing the image on the screen.

2.8 Upper body:

Upper body holds many of the units firmly with their relative positions unchanged. This acts as a screen to arrest all the rays coming out of the epidiascope.

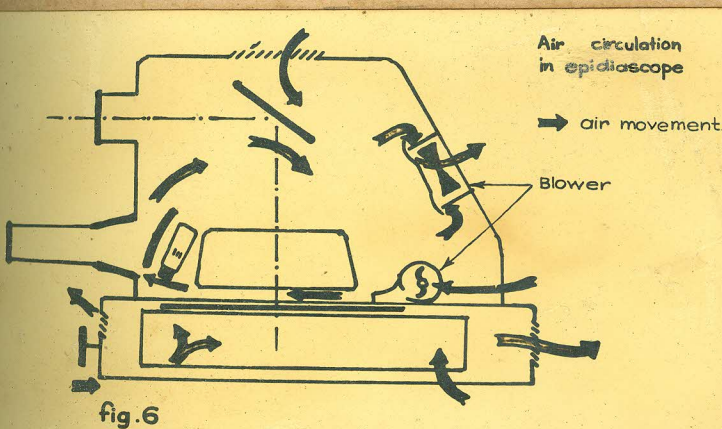
2.9 Lower body:

This part supports the picture table and raising device. The heat proof glass is also accommodated in the lower body. This lower body acts as support for the upper body.

2.10 Cooling system:

The epidiascope is heated very much during operation. This may shorten the life of mirrors, lenses, wires and even projection lamp. If the cooling system is inefficient the slides as well as the photograph or figures for

epiprojection is likely to be damaged. Fig. 6.



2.11 Raising device:

Many times the screen cannot be kept in the same level as the epidiascope because of the flat horizontal auditorium floor. For this reason, to project the picture to a screen above the level of epidiascope, the front portion of epidiascope has to be raised.

2.12 Pointer attachment:

It saves a lot of time and eliminates the difficulty of the man who explains the picture projected to the screen. He can explain

and point out some areas of interest in the picture standing near the epidiascope.

3. ERGONOMICAL ANALYSIS OF TOTAL PRODUCT

The accessibility inside the epidiascope is very poor. So cleaning the lenses and mirrors is difficult. There is the possibility of projection bulb being dropped inside the epidiascope because of poor accessibility. Another main difficulty while dismantling some parts is that nuts are lost inside the epidiascope.

We are applying more force to bring down the picture table.

Focusing of a slide is done by turning the objective lens barrel and is bit inconvenient for the operator to stretch his hand when he is seated in a chair. But the arrangement for epiprojection is comfortable. The lever for changing epiprojection to slide projection or vice versa does not fit properly in the palm.

The illumination for epiprojection is not satisfactory in epidiascope which necessitates a dark room projection.

Streaks of light do not leak out of epidiascopes. Thus the operator is not strained.

Pointer attachment is a very convenient way of explaining the picture standing near the epidiascope.

In the dark room it is very difficult to identify the position of switches for blower and lamp. Three pin plug is used for powers supply. Even when blowers are working some parts of epidiascopes are heated very much because of poor ventilation.

Another main problem with the epidiascope is, that it is very difficult to push the upper body over the lower body for projecting long pictures. Some times it is likely to topple down if it is placed in light or small table. The overall size and weight of the epidiascope is too much. So storing and shifting is a big problem.

4. STRUCTURAL AND FUNCTIONAL ANALYSIS OF THE TOTAL PRODUCT

Structural

The various elements are arranged in a box made up of mild steel pressings and sheets welded together. The sheet thickness is 16 guage. The picture table is fitted on to the upper body by welding. Ventilation holes are punched on the body and made light tight.

Functional

Epidiascope is used to project opaque photographs, written materials and transparencies. Lens system for opaque projection (epiprojection) is different from that of slide projection (diascopic projection). The picture table, mirrors, reflector, reversing mirror and the top lens system functions during epiprojection. When projecting slides the reflector, slide holder and the lens unit comes into play. The common elements in both the projection systems are

1. Projection lamp
2. Reflector

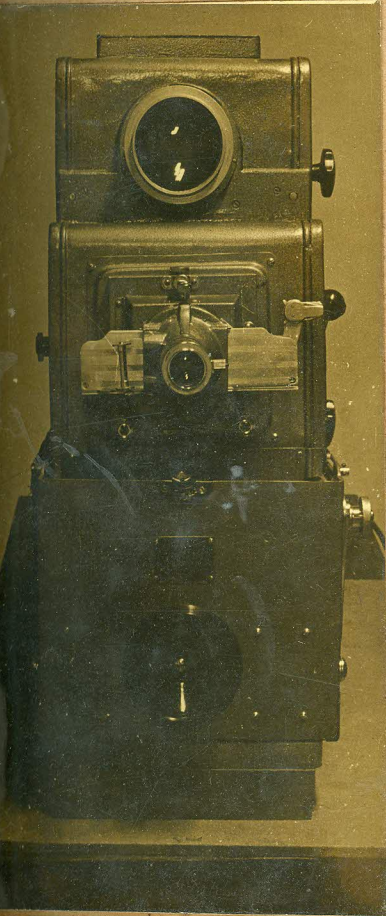
Arrangement

In this epidiascope the image distance can be varied from 4.5 m to 10.5 m. Accordingly a travel of 6 cm is given for the lens system. The head can be raised to a height of 12 cm to project the pictures at a height. But in this case the screen has to be kept at an inclination to avoid the effect called 'key stoning'. The epidiascope has to be kept on a table of height 80 cm during projection. The unit is very heavy and bulky and so the storing problem is also increased.

5. FORMAL ANALYSIS OF THE TOTAL PRODUCT



The product is very bulky. The visual bulk could have been reduced by proper arrangement of masses. The details on the diascopic attachment looks like a machinery and lacks integrity. Lot of sudden steps are introduced in the design so the eye travel is interrupted. The picture table unit even-though travels by a distance of 6 cm, it is having a height of approximately $\frac{2}{3}$ the height of upper body. Refer photo 7 and 10.



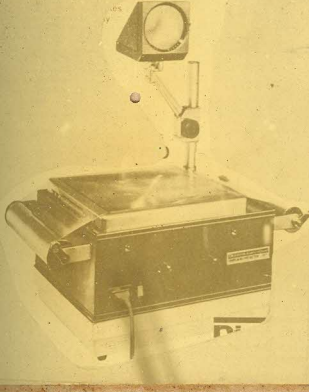
The head raising knob is very prominent having diameter more than the lens dia which is not needed in the ergonomical point of view. Photo 10.

The colour of the product is silver grey. A hammer tone finish is given outside to hide the weld marks.

Decoration works are tried lavishly which do not entrance form. The decoration works done on the slide holder looks very crude and is not at all functional. Communication is very poor, so often the operator confuses one knob from another and the graphics are not readable. Again the same name plates are repeated several times; even then it failed to catch the attention.

Altogether the equipment does not look like
an audiovisual aid because it lacks the sophis-
tication to go with the educational field of
today.

Overhead Projector



6. EXISTING AUDIOVISUAL AIDS

6.1 Overhead projector:

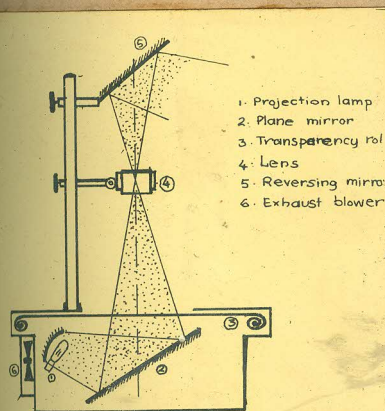
This is a very popular visual aid in western countries. Some of the Indian schools are also using overhead projectors. We are importing overhead projectors, so the popularity is not much. The manufacturing cost of a Phillips(Holland) overhead projector is Rs.1100.

The advantage of overhead projector is more compared to other visual aids like epidiascope, movie projector, etc.

Principle:

The principle of working is as shown in fig.9. The operator writes on a acetate paper with a ceramic pencil. This is projected to the screen using mirrors and lens.

This consists of a box which accommodates projection lamp, reflector, plane mirror and a translucent acetate film roll. Above the box a vertical pillar is fitted on which a lens unit and a reversing mirror is slid. The lens has got focusing arrangement.



From the projection lamp light rays travel towards the plane mirror and is reflected and passes through the acetate film, with written materials, and is focused using the lens system. Lateral inversion is done by the top reversing mirror and is directed to the screen.

The most common sizes of acetate films are 10 inches by 10 inches, 7 inches by 7 inches and 5 inches by 5 inches. Since the overhead projectors are placed near to the screen (1 meter to 3 meter) lens of short focal length is used.

Merits:

1. A dark auditorium is not needed.
2. The presenter can face the audience while operating the overhead projector.
3. As the teacher writes on the acetate paper it is projected on to the screen.
4. Slides and photographs need not be collected.

Demerits:

1. The larger model projector is bulky to transport and awkward to set up.

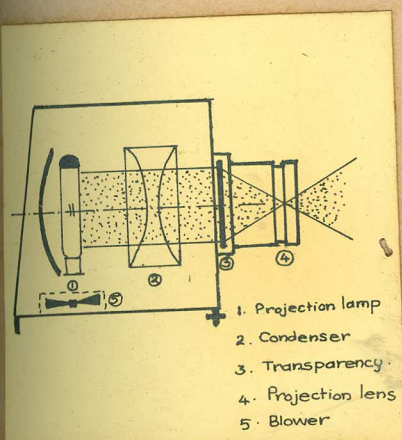
2. This works well for informal training sessions, the medium lacks polish and sophistication necessary for more professional presentations.

6.2 Slide projector:

This is a very popular visual aid throughout the world. Slides can be in colour or black and white. Colour slides are growing rapidly in popularity and usage. Slide projector can be used in presentation to both large and small audience. Slide projection has got professional appearance. So it can be used for any kind of audience, from executive meeting to class rooms. This is a compact unit and storing problem is less. Automatic slide projectors are also available which are very useful for programmed lectures.

Principle:

This instrument consists of a projection lamp, condensor, slide holder and a projection lens. The wattage of bulb generally used is 750 w and 500 w.



A parallel beam of light is passed through a condenser. This beam of light passes through

the transparency in the slide holder and is projected to the screen using projection lens. The projection lens has got focusing arrangement.

The common sizes of slides used are 2 inches by 2 inches, $2\frac{1}{4}$ inches by $2\frac{1}{4}$ inches and $3\frac{1}{4}$ by 4 inches. The last one is generally called lantern slides.

Merits:

1. This can be used for any kind of audience.
2. Slide projection is more appealing than epidiascope or overhead projection.
3. Slide projector is portable.
4. Slide do not require much space to store.

Demerits:

1. Slide making is quite expensive.
2. Materials for projection (ready made slides) on some particular subjects taught is also difficult^{get}. This case is not true in developed countries.

HYPOTHESIS

HYPOTHESIS

1. Structural and Functional:

- 1.1 The size of picture table should be more than the existing one to have a good rest for big books, maps or photographs.
- 1.2 Some arrangement has to be done to avoid the distorsion of transparency due to heat of 1000 w lamp.
- 1.3 More illumination is required for epi-projection.
- 1.4 Efficient cooling system should be there to increase the life of lenses and mirrors.
- 1.5 Some other lamps like fluorascent lamps and halogen lamp should be tried for better illumination.
- 1.6 More versatile visual aid to have the advantage of overhead projection; movie projector should be attempted.
- 1.7 Maintenance should be as minimum as possible.
- 1.8 The design has to be done for batch production

2. Ergonomical:

- 2.1 Easyness of operation should be given importance.
- 2.2 The unit should be compact so that storing problem is not much.
- 2.3 The unit should be light for easy shifting from one place to another.
- 2.4 Cleaning of the lenses and mirrors should be easy.

3. Formal:

- 3.1 The form should be integrated and it should go well with the educational field.
- 3.2 Better communication for operating the instrument should be provided.

4. Cost:

Manufacturing cost should be below Rs.500.

SYNTHESIS.

SYNTHESIS

This design was attempted taking care of the consumer's and manufacturer's information and their requirements. The survey on "consumer's need" was done in ten educational institutions of Bombay. But because of lack of technical informations from the factory I had to limit my design taking some of the standard available parts. The following are the main features of this product.

Functional:

This is a versatile visual aid. This serves as a overhead projector and as an episcopo. The maximum size of the photographs which can be projected with this equipment is 26 x 26 cm, whereas in the existing one it is 18 x 18 cm. The cooling system is more efficient because the hot gas has to travel a small distance only to get exhausted. The lens is protected from the direct heat waves coming from the lamp. Bigger books can be projected with this equipment than the existing one. The illumination is increased because of stainless steel mirror.

Structural:

The product is designed for batch production. Most of the joints are done with screws and bolts except few spot and gas weldings. Only two castings are present in this design. All other parts are done with the sheet metal and M.S. rod. In many places standard parts are used. The design consists of four units which can be detached easily.

Ergonomical:

The picture table is improved for convenience of operation. Bigger books to small papers can be placed conveniently. While packing and storing most of the parts can be detached. The access to the optical parts is very much improved in this design. As the writing surface is flush with the projection lamp unit and the minimum rest for the palm while writing is 12 cm, it is very convenient for writing when used as a overhead projector. Top portion of the projection lamp unit will not be heated much because of the asbestos sheet. The switches are placed at a convenient place so that the operator does not have to stretch his hand too much. The springs of the picture table is designed in such a way that the operator has

to apply a torque, less than 4000 gm cm to operate it, which an average man can apply in this way. Sharp corners are avoided outside.

Economy:

The manufacturing cost of this product will be less than Rs.

Formal:

The basic shape is derived from the function. Because of the limitations in batch production, much formal improvements were not possible. Care was given to reduce the visual weight of the upper body to give a feeling of stability.

Arrangements:

This product can be used by schools with and without dark rooms. The common units for eip-projection and overhead projection are:

1. Central unit
2. Top unit.

For using the episcope unit as overhead projector the writing unit, rod and lens of shorter focal length will be supplied as attachments. Similarly to use the overhead projector as episcope the attachment will be the

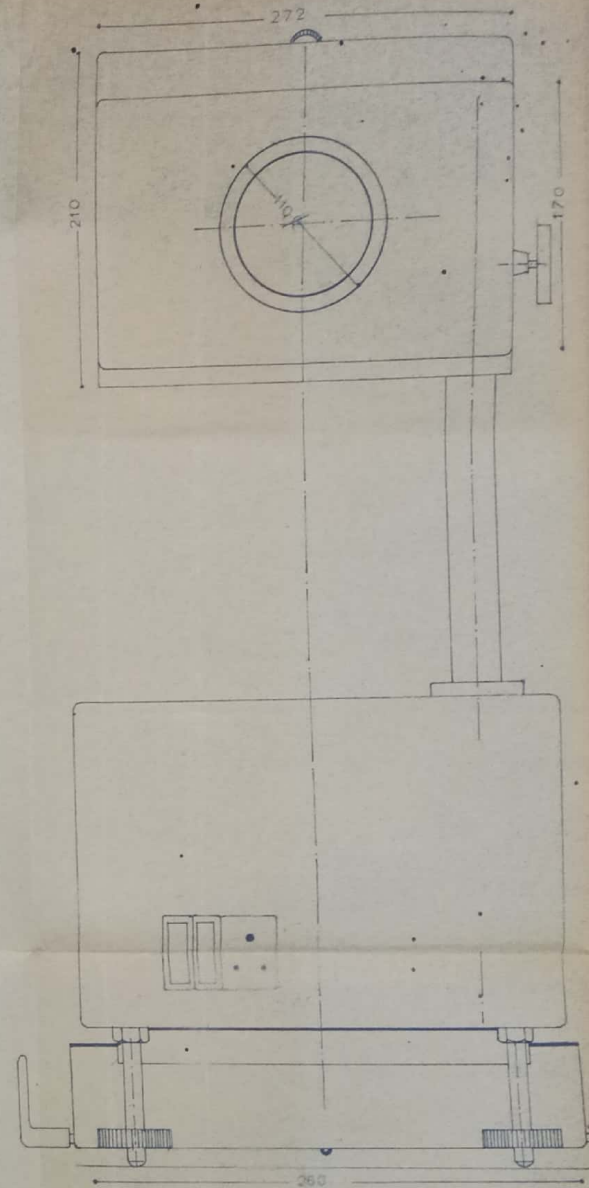
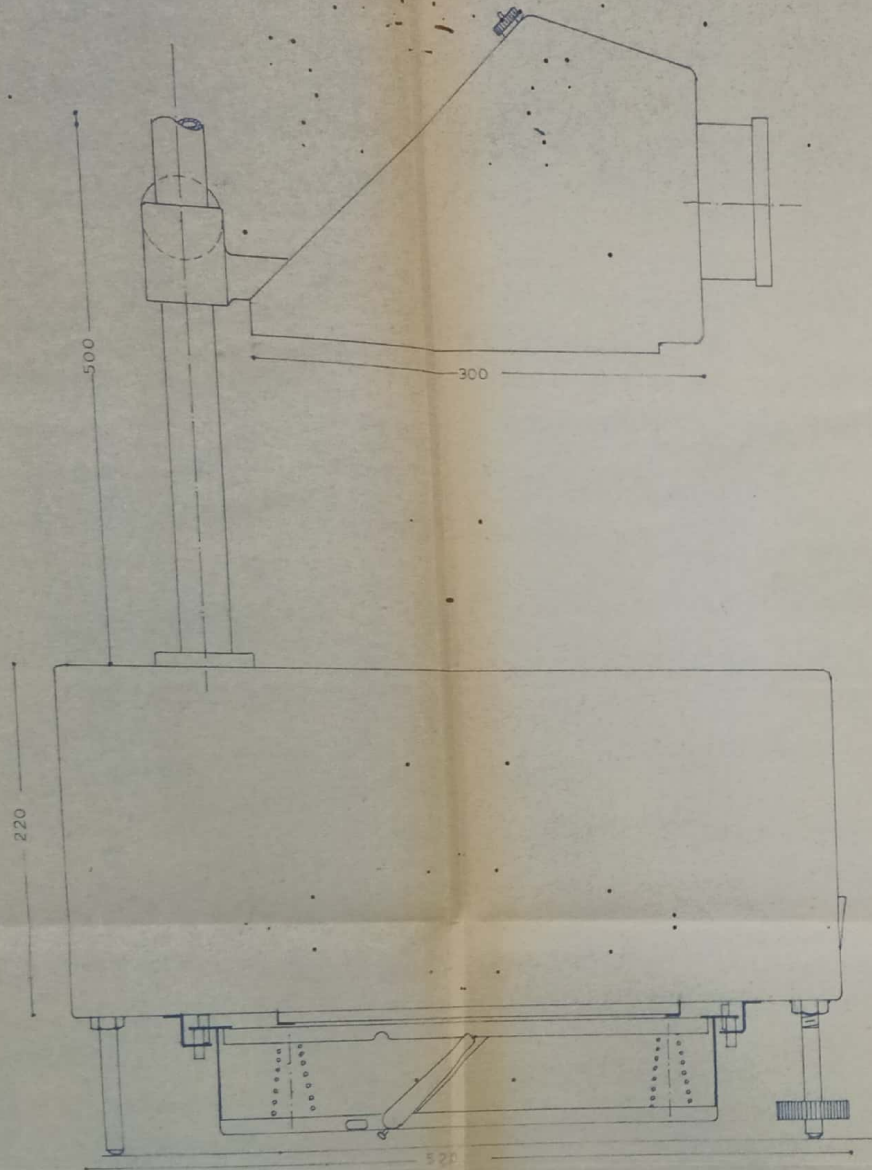
picture table and lens of longer focal length. The focal length of the lens can be varied either by attaching or detaching some lens or changing the whole projection lens.

The equipment is placed at a distance of 1 m to 3 m from the screen when used as a overhead projector depending upon the size of the room and magnification required. When used as a episcopes it is placed at a distance of 4 m to 6 m from the screen.

The equipment when placed on a standard table (75 cm high) it is convenient for a teacher to write on the writing unit, in standing position. In this case the height of writing surface is 109 cm from the ground level.

Flexibility:

The attachment for the slide projection can also be done without making much change on the existing equipment.



DIPLOMA PROJECT

FINAL ASSEMBLY

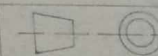
SCALE 1:2.5

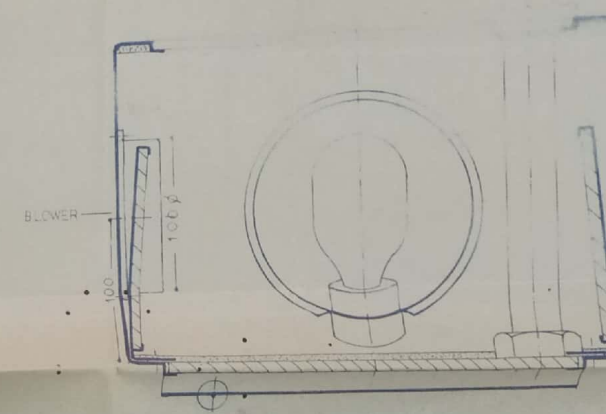
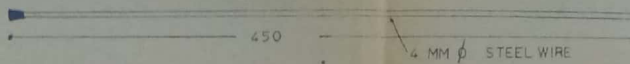
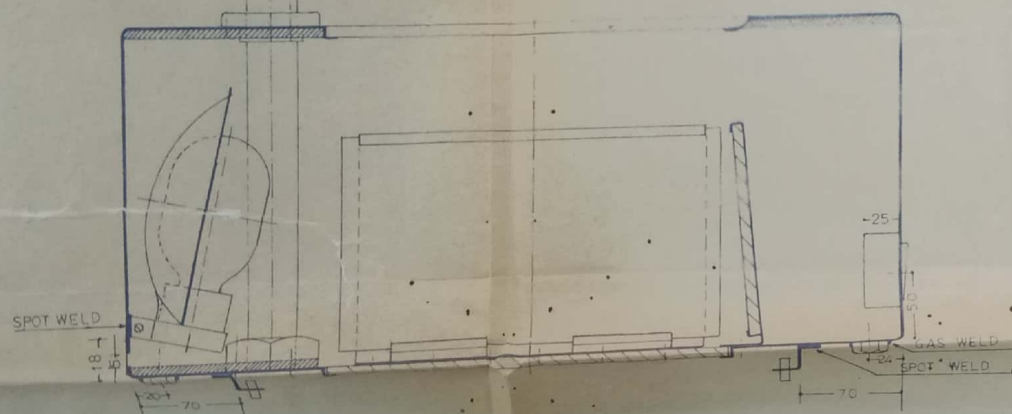
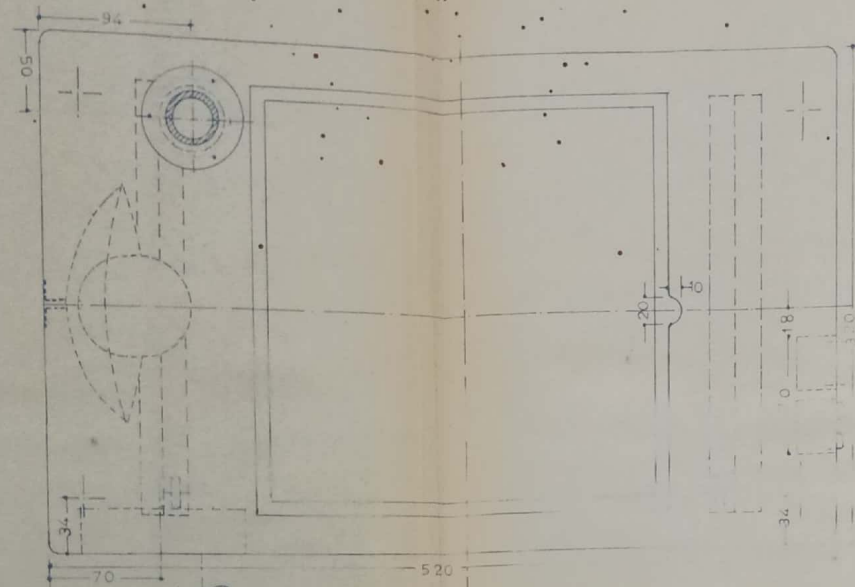
DIMENSIONS IN MM

I D C

R. KADIRU

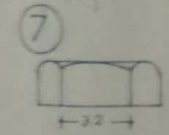
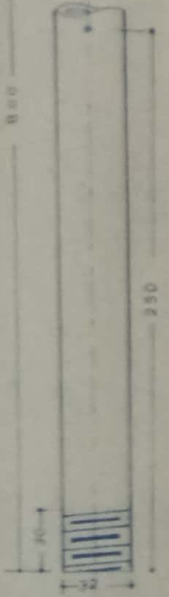
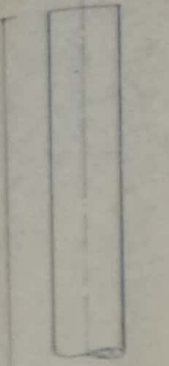
II BATCH



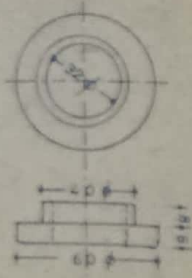


DIPLOMA PROJECT		R KADIRU	
LAMP UNIT		II BATCH	
SCALE 1:2.5			
DIMENSIONS IN MM			
I . D . C			

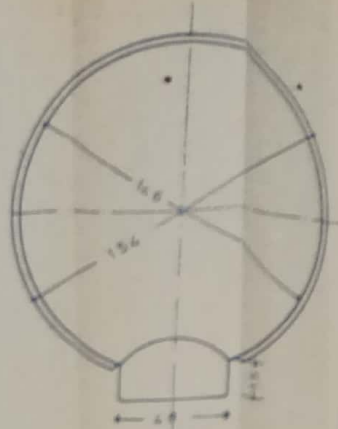
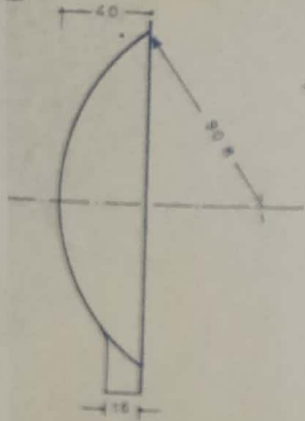
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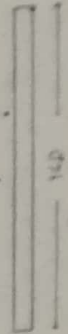
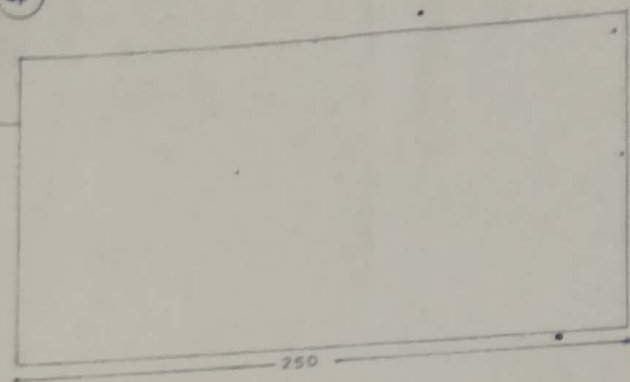
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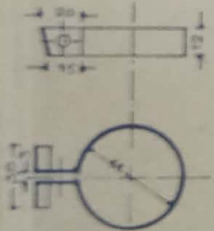
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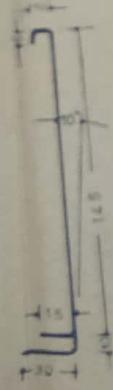
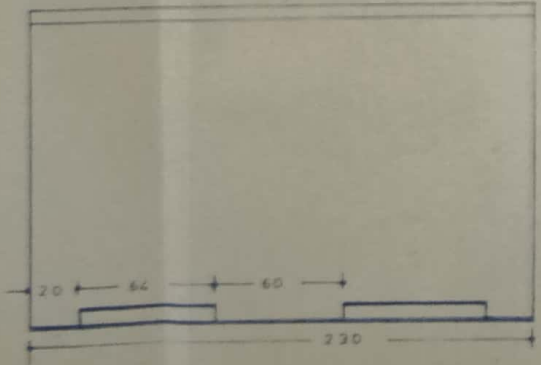
4



6



5



7	BUSH FOR THE PILLAR	M S	1
6	LAMP	M S SHEET 12 SWG	1
5	LAMP FRAME	M S SHEET 12 SWG	3
4	FLAME MIRROR	SILVERD GLASS 3MM	3
3	REFLECTOR	STAINLESS STEEL 18 SWG	1
2	BUSH	M S	1
1	SUPPORT FOR TOP UNIT	M S TUBE PLATED	1
ITEM	DESCRIPTION	MATERIAL	NO. OFF

DIPLOMA PROJECT

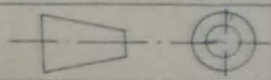
LAMP UNIT PART DRG:

R. KADIRU

II BATCH

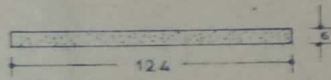
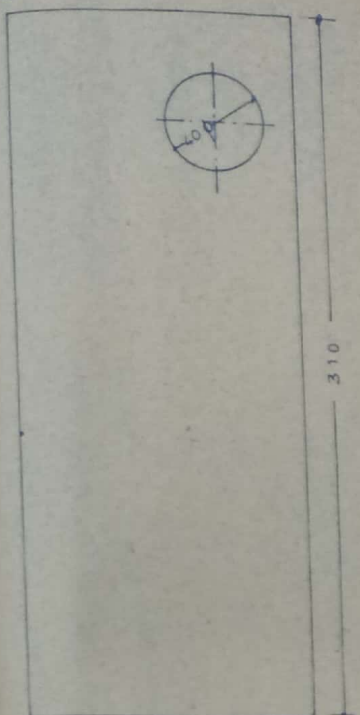
SCALE 1:2.5

DIMENSIONS IN MM

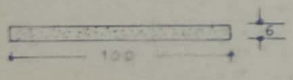
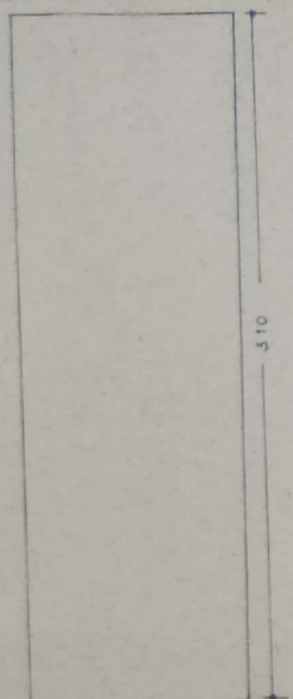


D. C.

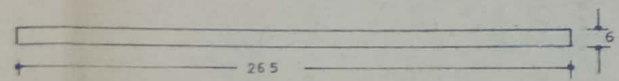
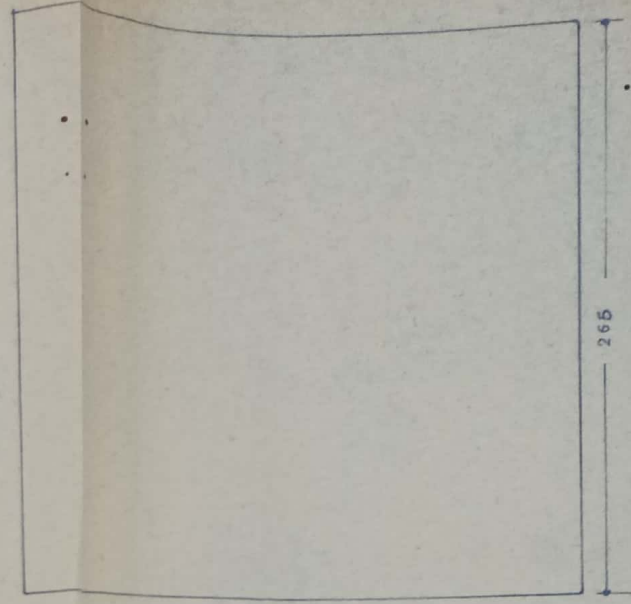
①



②



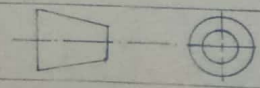
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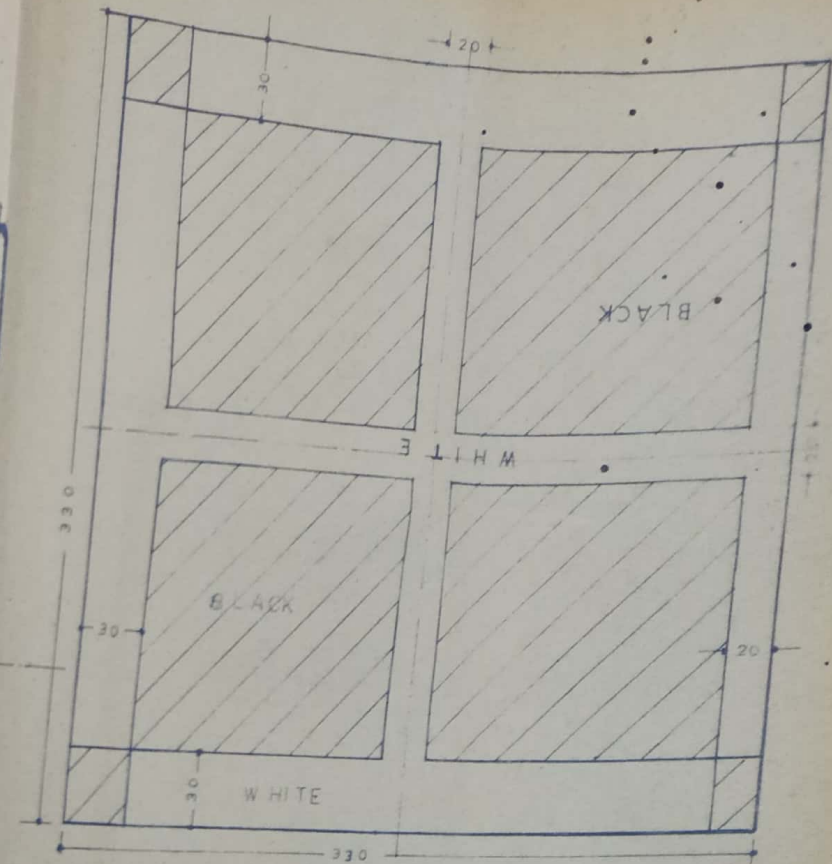
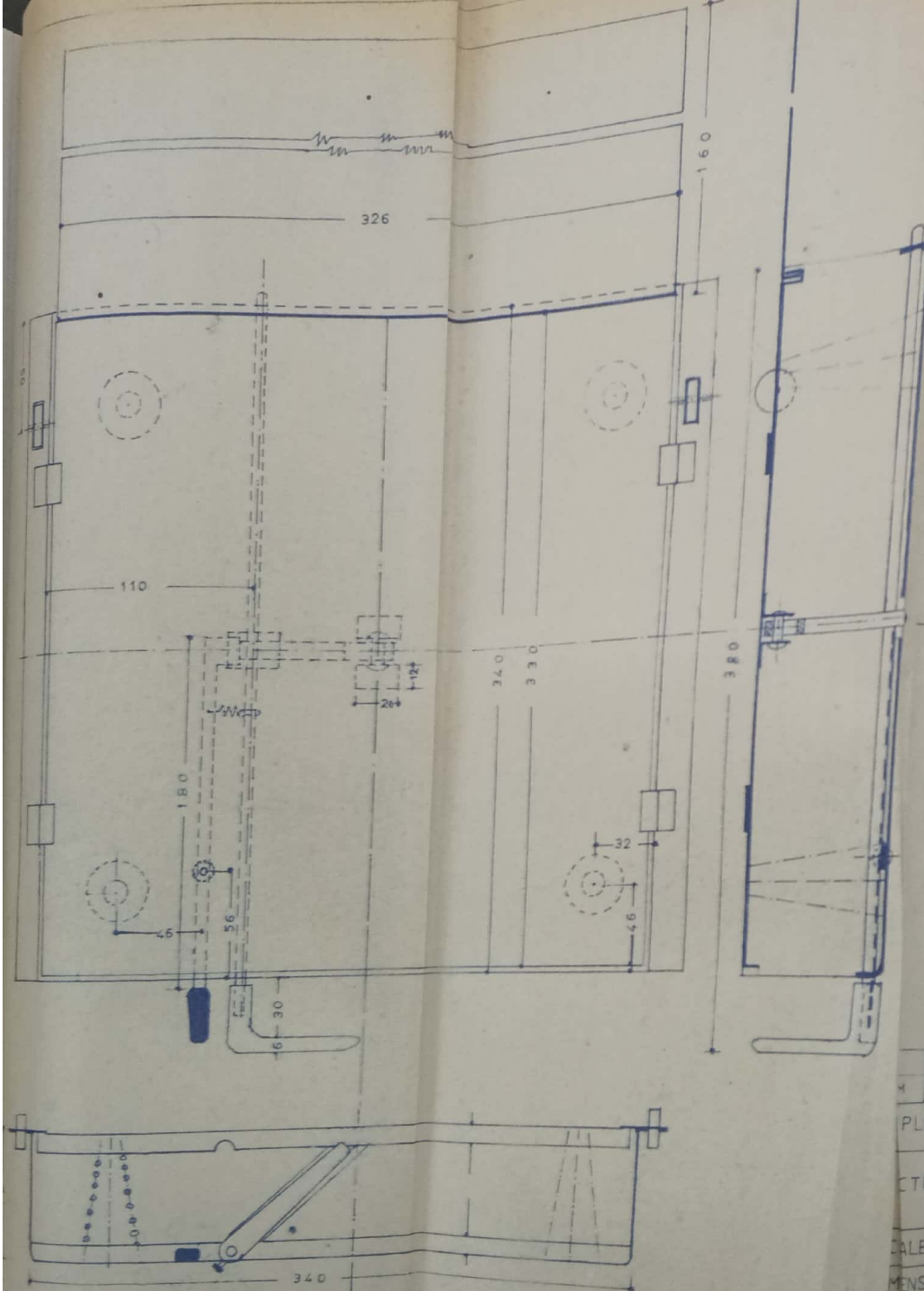


3	TOP AND BOTTOM OF LAMP UNIT	PLATE GLASS	6 MM	2
2	ASBESTOES	ASBESTOES SHEET	6 MM	1
1	ASBESTOES	ASBESTOES SHEET	6 MM	1
ITEM	DESCRIPTION	MATERIAL		NO OFF

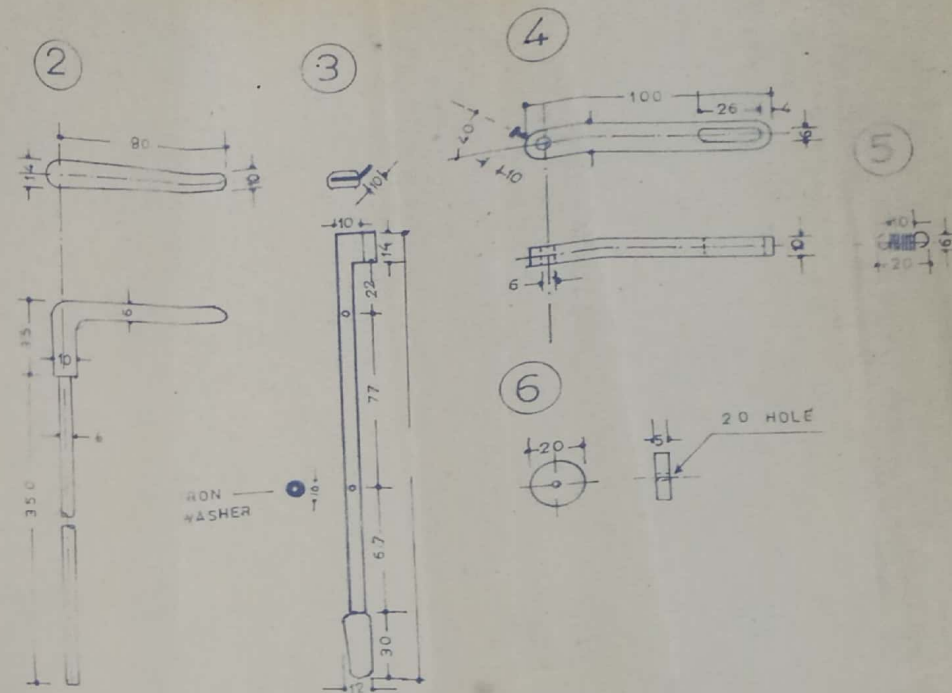
DIPLOMA PROJECT

LAMP UNIT - PART DRG:	R. KADIRU
SCALE 1:2.5	II BATCH
DIMENSIONS IN MM	
D . C	

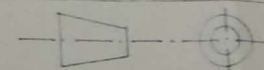




REST FOR BOOKS	FELT GLUED	1
DESCRIPTION	MATERIAL	NO OF
DIPLOMA PROJECT		
PICTURE TABLE		R. KADIRU
SCALE 1:2.5		II. BATCH
DIMENSIONS IN MM		
D. C		

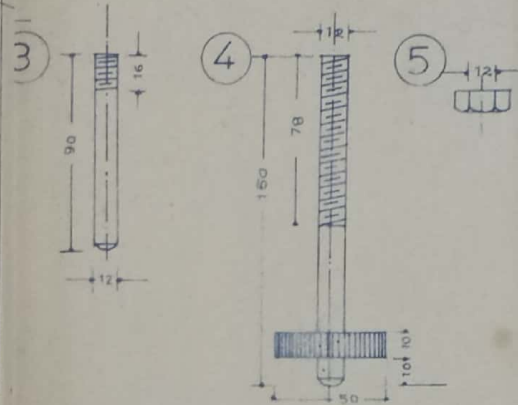
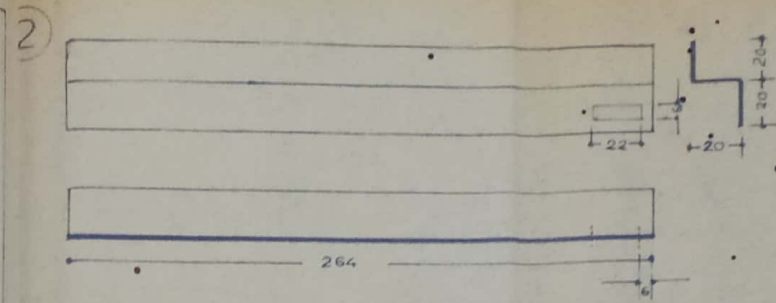
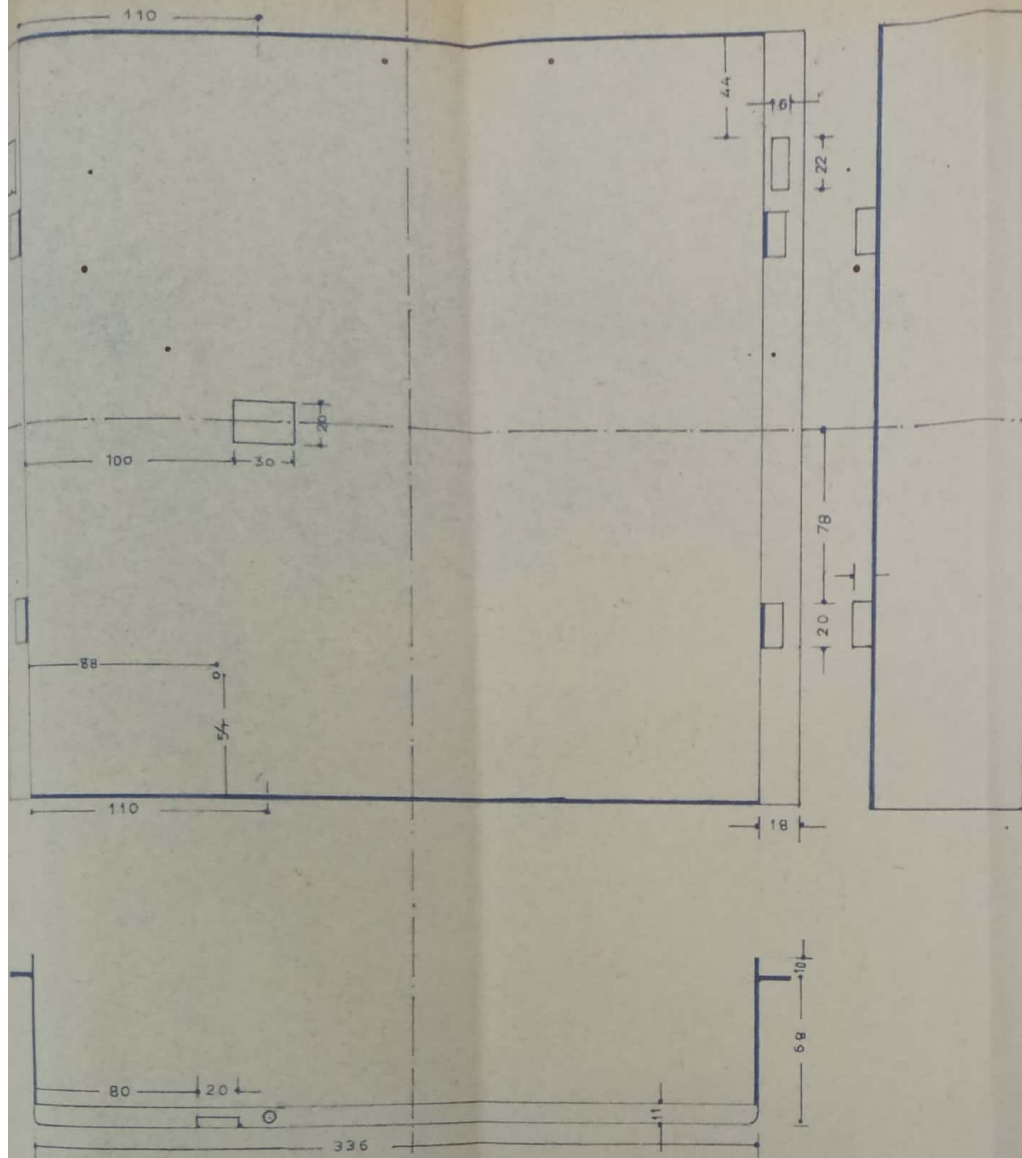


PICTURE TABLE - PARTS



R. K ADIRU

11 BATCH



NUT	M. S.	4
LEVELLING LEG	M. S.	2
LEG	M. S.	2
REST FOR PICTURE TABLE	M. S. SHEET 18 SW G	2
BOTTOM PART OF PICTURE TABLE	M. S. SHEET 18 SW G	1
M DESCRIPTION	MATERIAL	NO OFF

DIPLOMA PROJECT

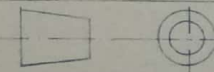
ICTURE TABLE - PART DRG:

R. KADIRU

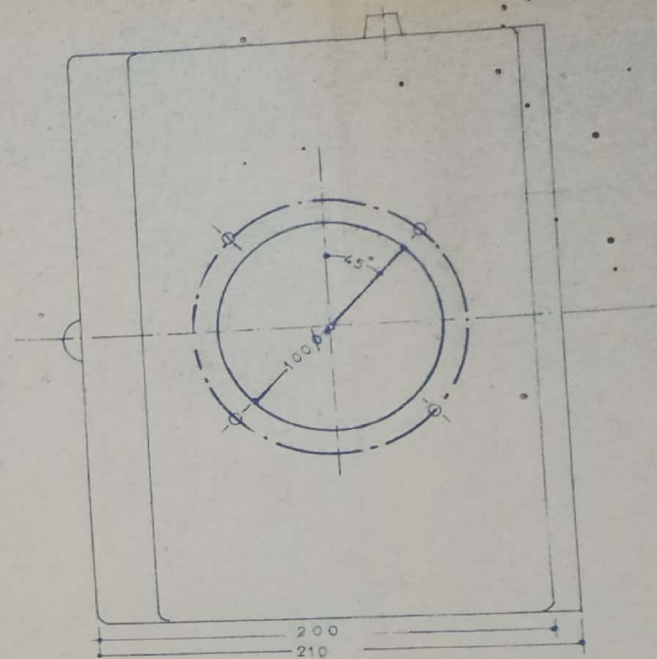
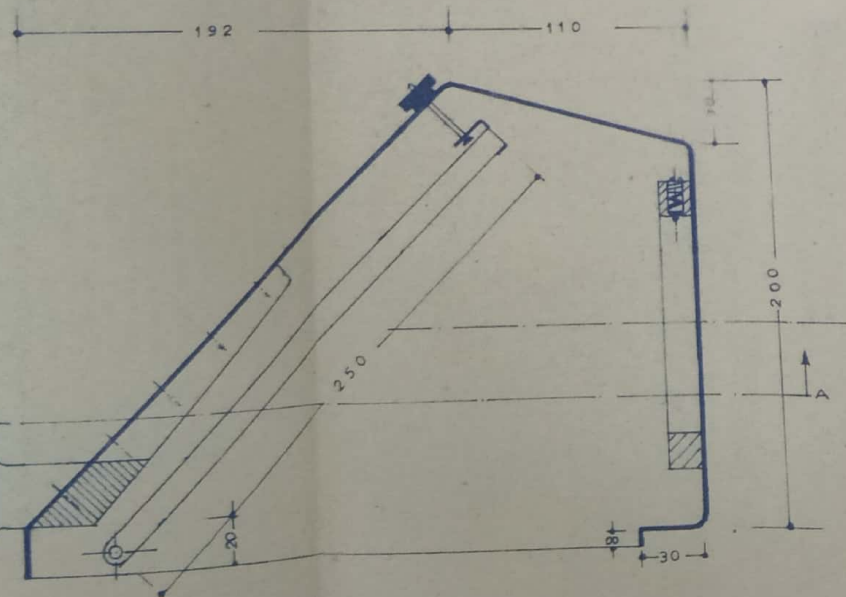
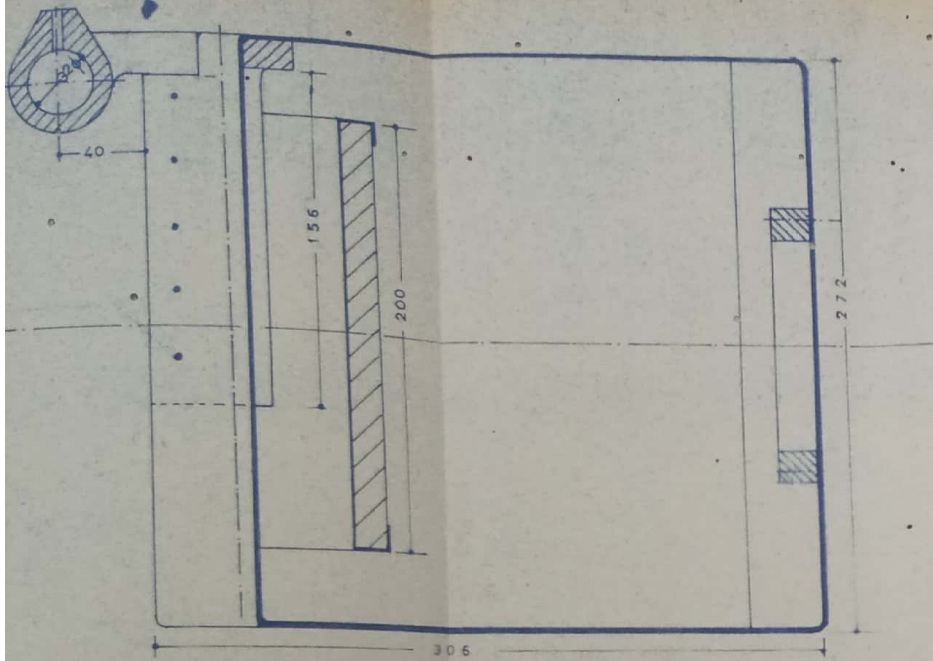
II BATCH

SCALE 1 : 25

MENSIONS IN MM



D C



DIPLOMA PROJECT

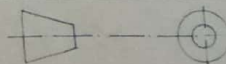
TOP UNIT

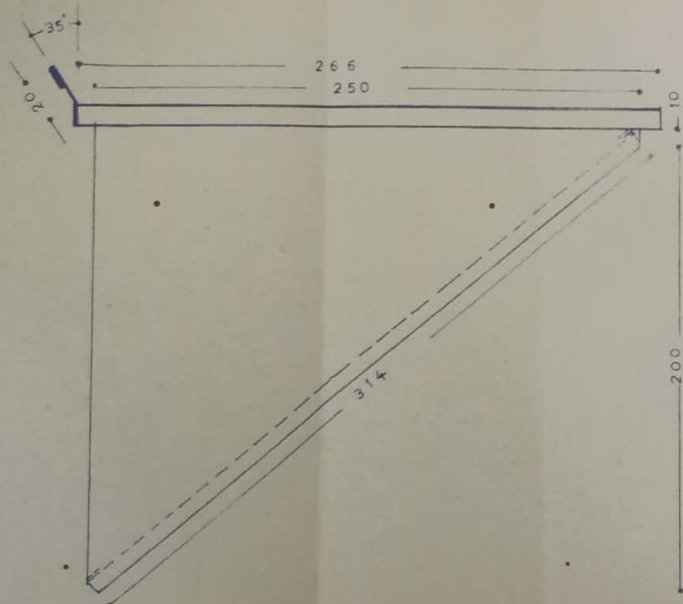
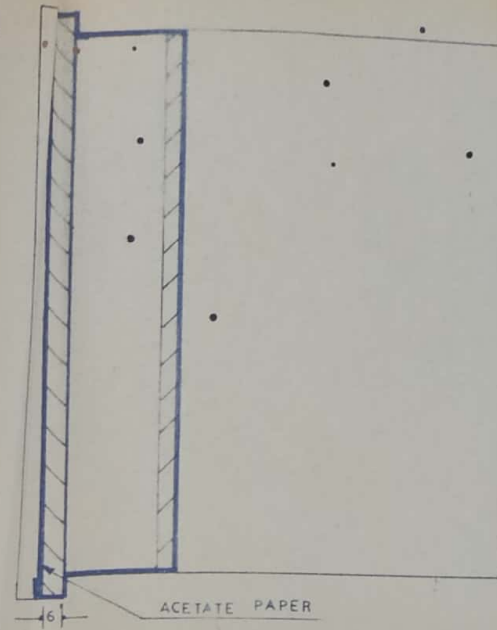
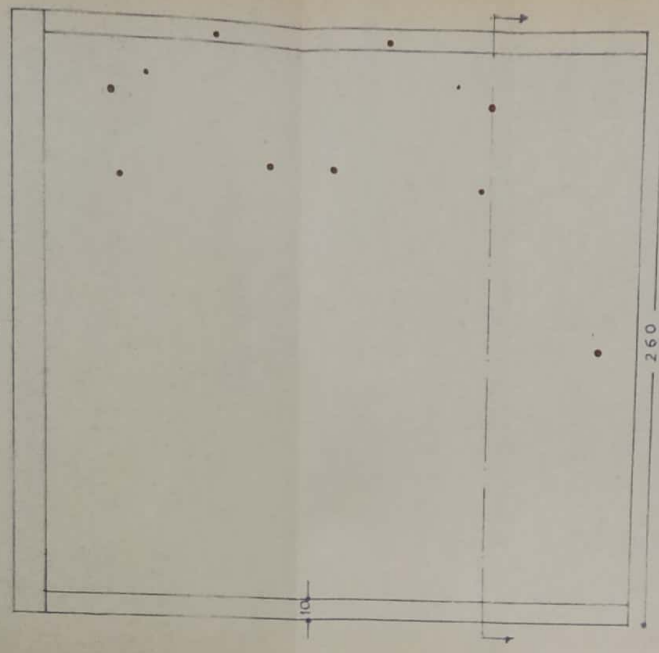
SCALE 1:2.5
DIMENSIONS IN MM

1 3 C

R. KADIRU

H BATCH





4	ACETATE PAPER 25 BY 26 CM	ACETATE	4 OR 5
3	PLANE GLASS	GLASS 6 MM THICK	1
2	PLANE MIRROR	SILVERD GLASS 6 MM THICK	1
1	METAL FRAME	M. S. SHEET 16.5 W G	1
ITEM	DESCRIPTION	MATERIAL	NO. OFF

DIPLOMA PROJECT

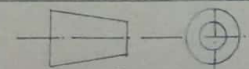
WRITING UNIT

R. KADIRU

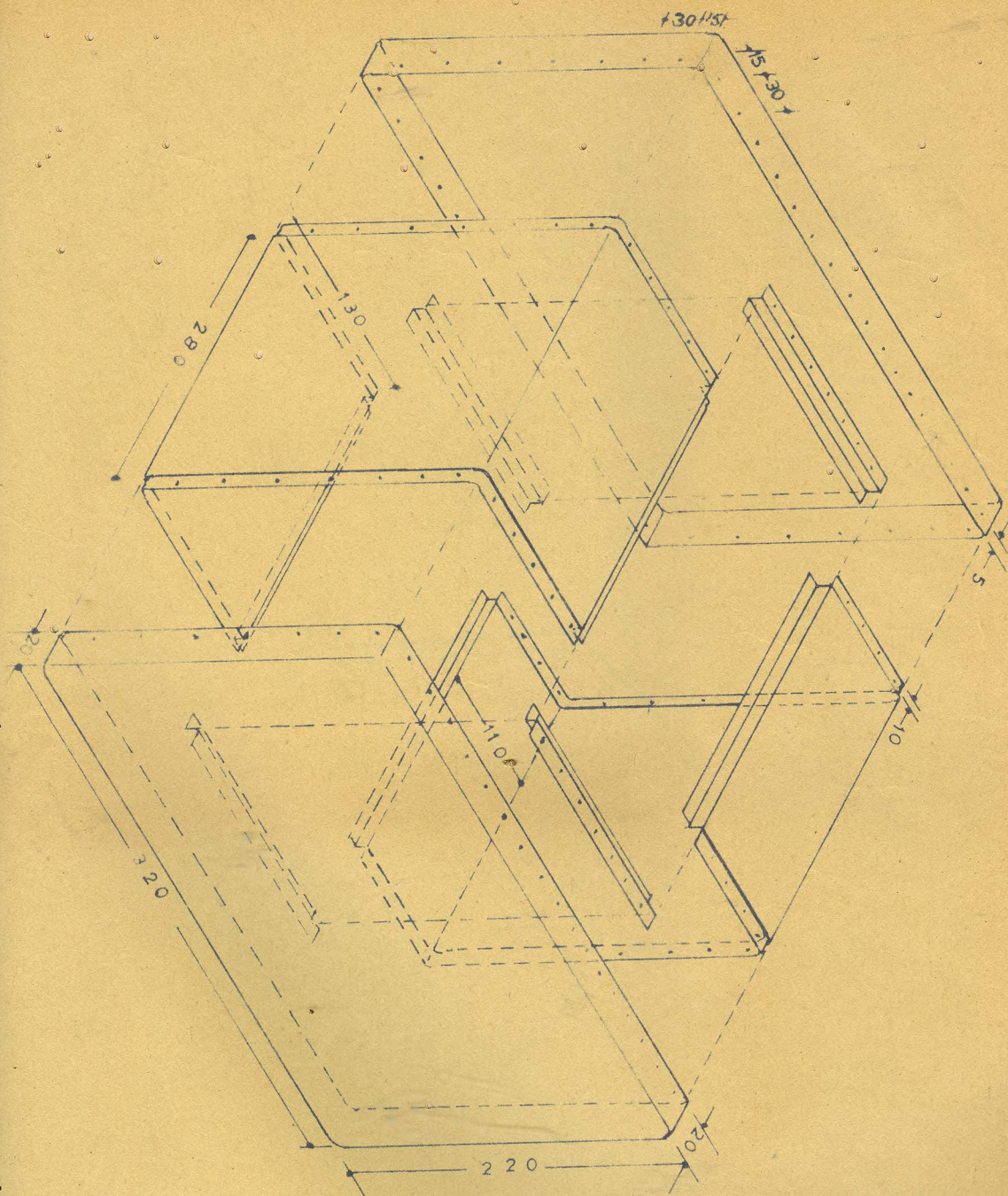
II BATCH

SCALE 1:2.5

DIMENSIONS IN MM



D



DIPLOMA PROJECT

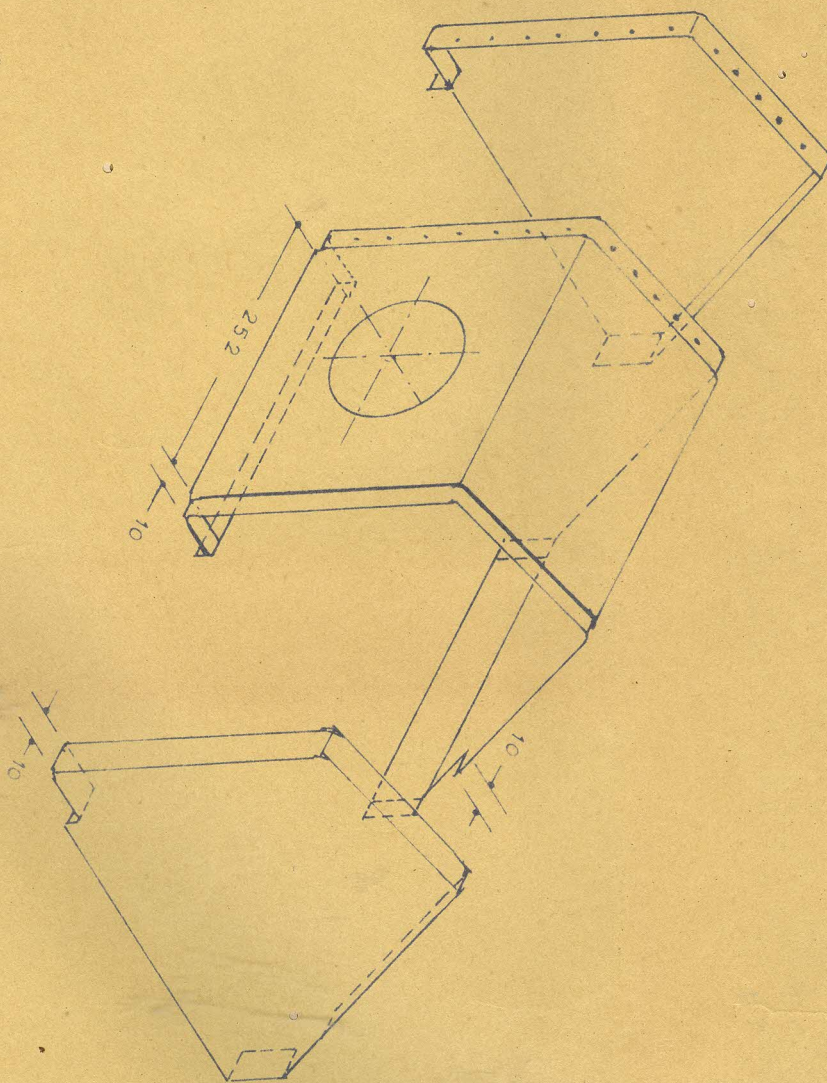
STRUCTURAL CONNECTION - LAMP UNIT

SCALE
DIMENSION IN MM



R. KADIRU

II BATCH



DIPLOMA PROJECT

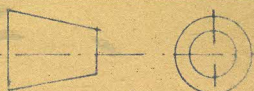
STRUCTURAL CONNECTION _ TOP UNIT

R . KADIRU

II BATCH

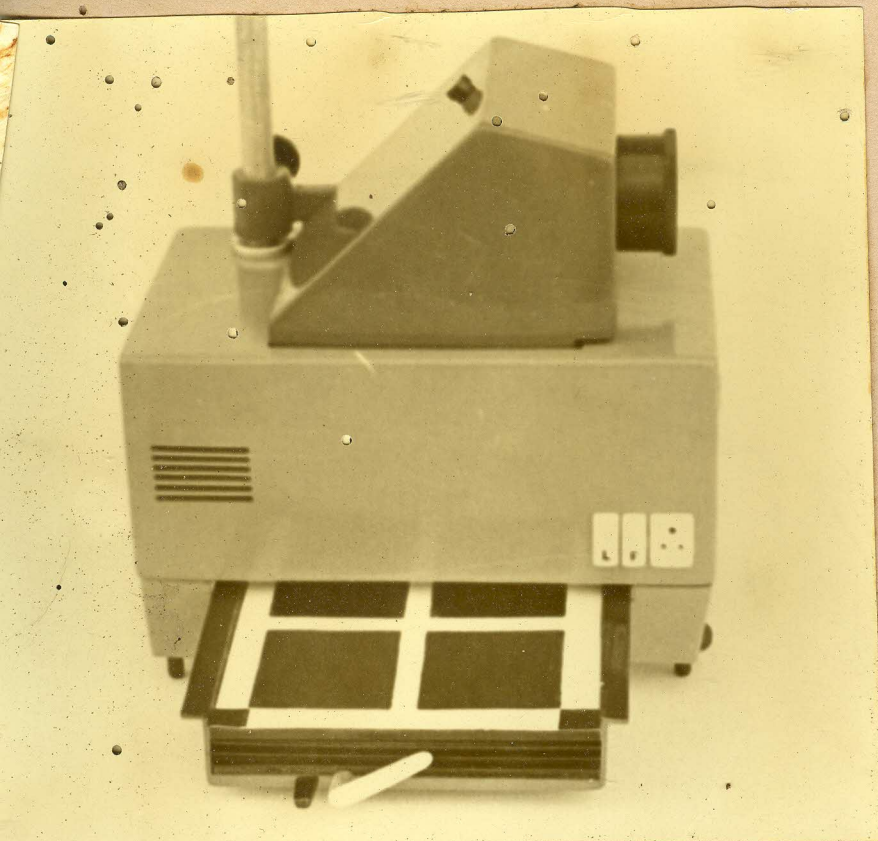
SCALE 2.5

DIMENSIONS IN MM

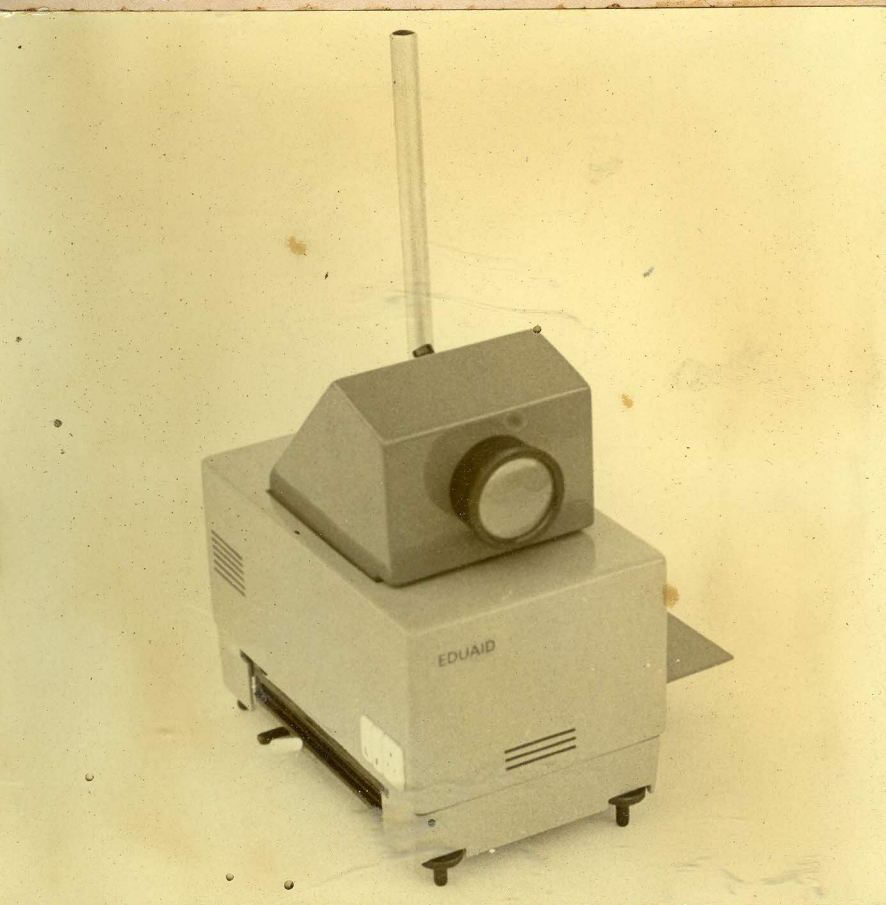


I D C

COMMUNICATION

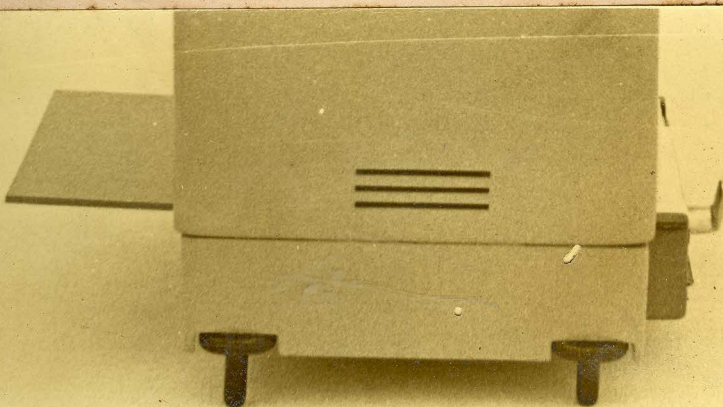
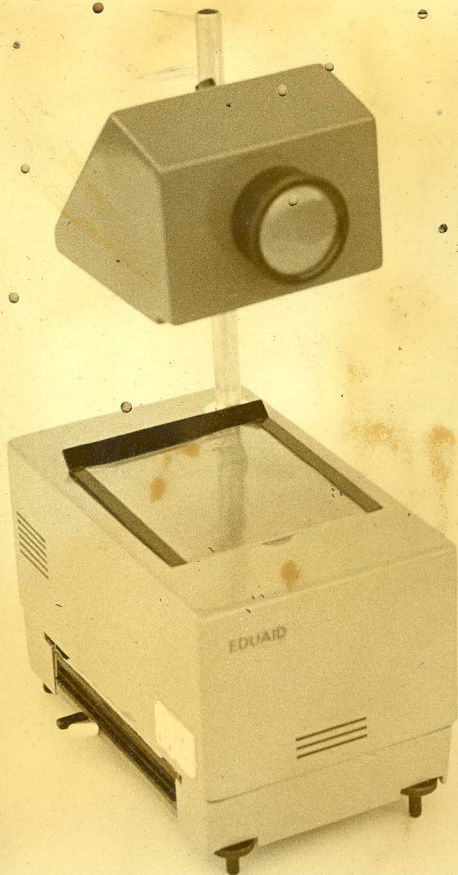


Ergonomical picture table. Drawer type picture table is convenient for operation. Location problem of the picture or photographs is partially solved by the white and black stripes on the felt over the picture table.

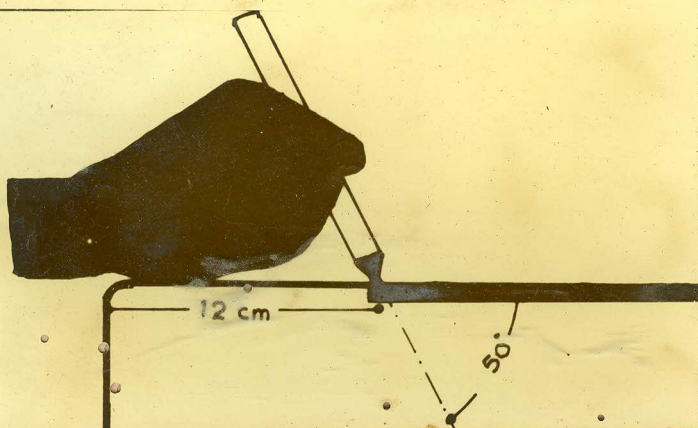


Versatile visual aid.
 1. As a episcope
 2. As a overhead projector.

I. D. C. Library
L. I. T. Bombay.

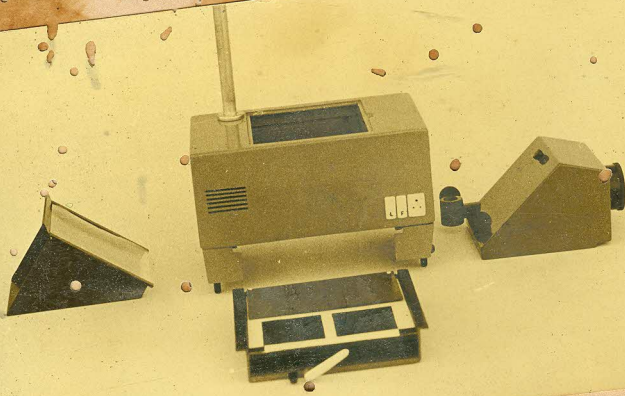


Good rest for books.
Attachment on the
picture table is pro-
vided for conveniently
using bigger books.

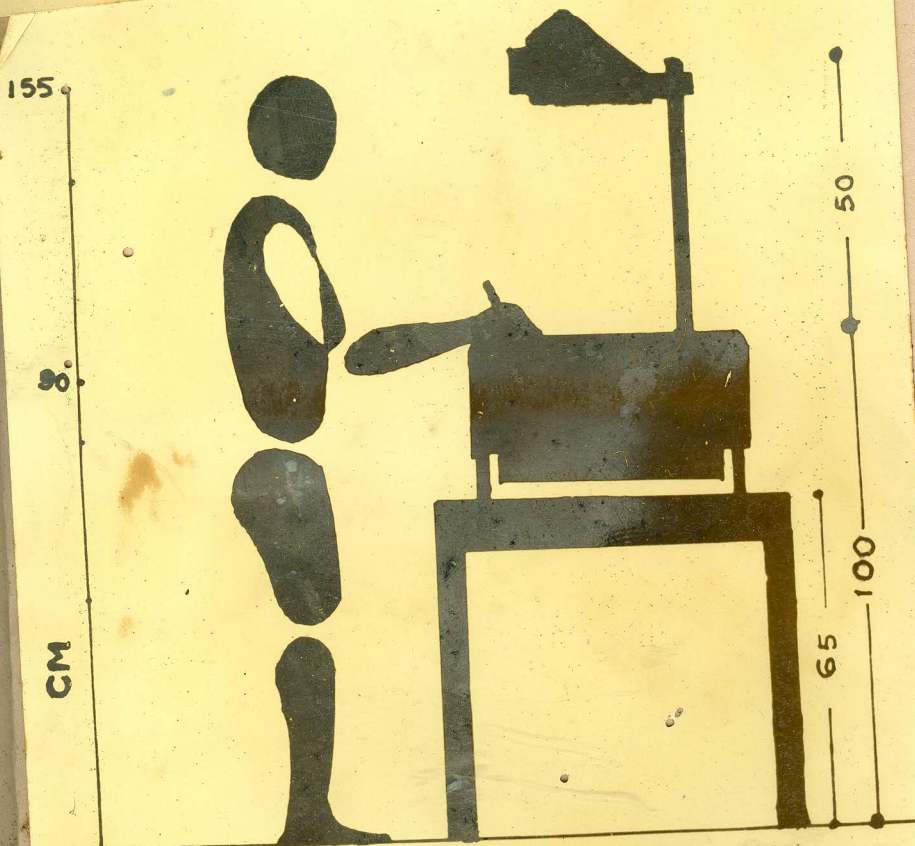


This equipment is con-
venient for writing
when used as a over-
head projector.

Storing and packing
is easy because the
units can be detached
very easily.



Height of operation
is sufficient when
placed on a standard
table.



Bibliography

1. Communication graphics - Mathew P. Murgio.
2. A manual of audio-visual techniques - Dekieffer and Cochran.
3. The audio-visual encyclopedia - Howard M. Tremaine.
4. The universal encyclopedia of machines.
5. Encyclopedia of photography.
6. A text book of physics - Grimsehl.
7. Geometrical optics - Curry.
8. Optics - Jenkin and White.
9. Design 258, 1970.