Findings and Discussion on Experimental Work

Seven subjects who had different disabilities and clothing problems were selected for the experimental work. For these subjects lower and upper garments were developed separately through designs, adaptations, closures, suitable fasteners and proper fit according to the subject's specific needs.

These designed garments were then evaluated by a panel of seven judges comprising clothing experts, occupational therapists and personnel of the Crippled Home. The judges rated the garments using a scale given in Appendix C. Each garment was scored for the adaptations and the various functional features introduced in the garments by the investigator to overcome the subject's dressing difficulties. So the evaluation of the garments was based on the criteria such as: (1) ease of wearing, (2) manipulation of fasteners, (3) fit of the garment, (4) appropriateness of the pattern for the disability, (5) appearance of the child when garment as put on, (6) its comfort and (7) ease of removing.

Findings of experimental work is presented in the form of case study of each subjects for whom garments were designed and constructed.

Case Study 1

Subject A:

A nine year old boy was born with congenital abnormalities of upper limbs (Plate 1). He had no left arm but just one finger present at shoulder; at the right side he had upper arm with no elbow movements and wrist with only three fingers. He lived with his parents and attended Crippled Home day school regularly. He could write and eat by himself.

Since he had only one half of the upper limb he faced difficulty while wearing lower as well as the upper garments.

His main dressing problems in wearing lower garments were:

1. While wearing plain cotton shorts with fasteners he completely depended on others for fastening.

2. He could not reach and use pocket.

3. He had difficulty in toiletting.

His mother solved the above problems by buying ready-made stretch shorts made of synthetic fabric with no elastic at the waist and no fasteners. He wiggled into it to wear but the mother had to pull up the left side of the shorts. She also reported that he developed skin rash, so it was not practical to use

PLATE – 1
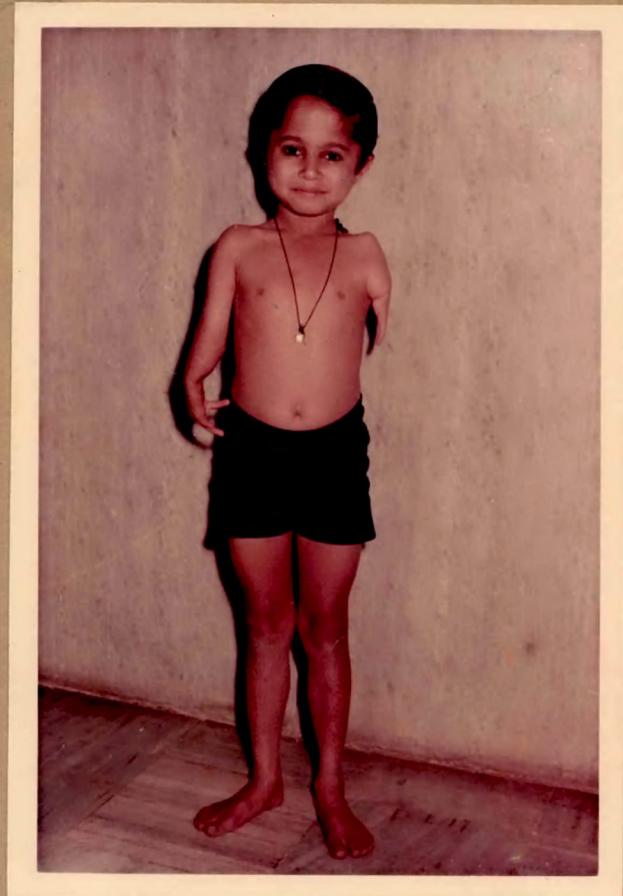
A BOY HAVING CONGENITAL
ABNORMALITIES OF UPPER LIMBS.

synthetic for all seasons. She preferred to dress him in trousers for his outings because of dry skin problem.

To overcome the above difficulties and to make him independent in wearing lower garment a pair of shorts was drafted. (Diagram 9).

<u>Drafting instructions for shorts</u>:   (Subject A)

    <u>Measurements</u>

1.	Short's length	=	25 cms
2.	Crotch length	=	16 cms
3.	Waist girth	=	54 cms
4.	Hip girth	=	58 cms
5.	Round leg	=	34 cms.

<u>Front</u>:   (Diagram 9)

A - D = Short s' length = 25 cms

A - C = Waist to crotch plus 2 cms = 16 + 2 = 18 cms

C - B = One-twelfth of the hip girth 4.8 cms

C - E = One-sixteenth of the hip girth 3.6 cms

Ĉ - G = Half measurement from C to E plus 1 cm at 45°
        1.8 + 1 = 2.8 cms

  Connect E-G-A as indicated on the diagram.

D - F = One-twelfth of the round leg 2.8 cms

    Connect E-F as shown on the diagram.

A - H = One-fourth of the waist girth plus 1 cm = 13.5 + 1 = 14.5 cms

DRAFT OF SHORTS (SUBJECT-A)

SCALE = 1/4
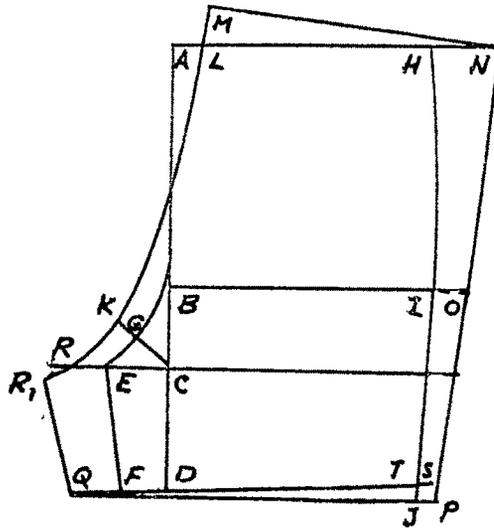
DIAGRAM - 9

B - I = One-fourth of the hip girth plus ·5 cm = 14.5 + .5 = 15 cms

F - J = Half round leg = 17 cms

Connect H-I-J as indicated on the diagram.

J - T = 1. cm.

Back: (Diagram 9)

The draft is made on that of the Front.

E - R = C-E or one-sixteenth of the hip girth 3.6 cms

R - R_1 = .5 cm

F - Q = D-F or one-twelfth of the round leg 2.8 cms

Connect R_1-Q as indicated on the diagram.

G - K = 1.5 cm

A - L = 1.5 cm

Connect R_1-K-L with a curve for crotch and continue to M which is 2 cms from L.

Extend A-H line.

M - N = One-fourth of the waist girth plus 3 cms on A-H line = 13.5 + 3 = 16.5 cms

I - O = 1.5 cm

J - P = 1.5 cm

Connect N-O-P as indicated on the diagram.

P - S = 1 cm

Connect Q-T-S.

The following features were designed in the Shorts:

Elastic used at the waist band: (Figure 3)

Elastic was inserted around the waist band to avoid fastening and slipping the shorts up and down easily.

Carriers of cloth sewn on the waist band: (Figure 4)

Six carriers were stitched on to the waist band to aid in pulling the shorts up. These were placed after taking care that some of them were within the reach of his right arm - two in the front, two at the back and one on either side (Figure 3).

In order to wear, he slipped into the shorts. To pull the shorts up, he bent and inserted his right hand finger (Plate 2) through anyone of these carriers except those on the left side which were not within his reach.

Change in the position of the pocket

The patch pockets were attached in the front just below the waist band within his reach. The left side pocket was for balance and right side served as functional. The subject could only use right side pocket since it was accessible to him.

Simulated fly: (Diagram 10)

Another difficult problem the subject faced was difficulty while toiletting. A simulated fly as shown in Figure 5 was

## SHORTS WITH ELASTIC AROUND WAIST CARRIERS
AND SIMULATED FLY
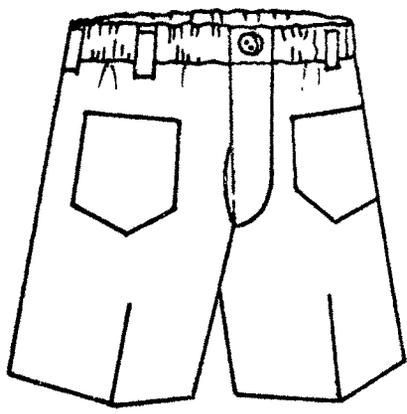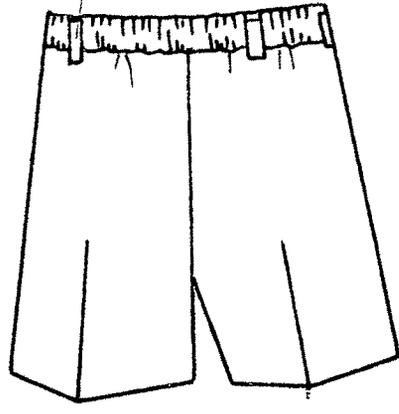
FRONT VIEW   BACK VIEW

FIGURE - 3
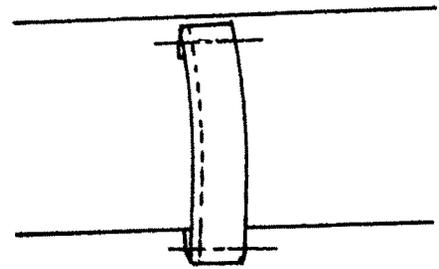
CARRIER MADE OF CLOTH TAPE

FIGURE - 4

PLATE – 2
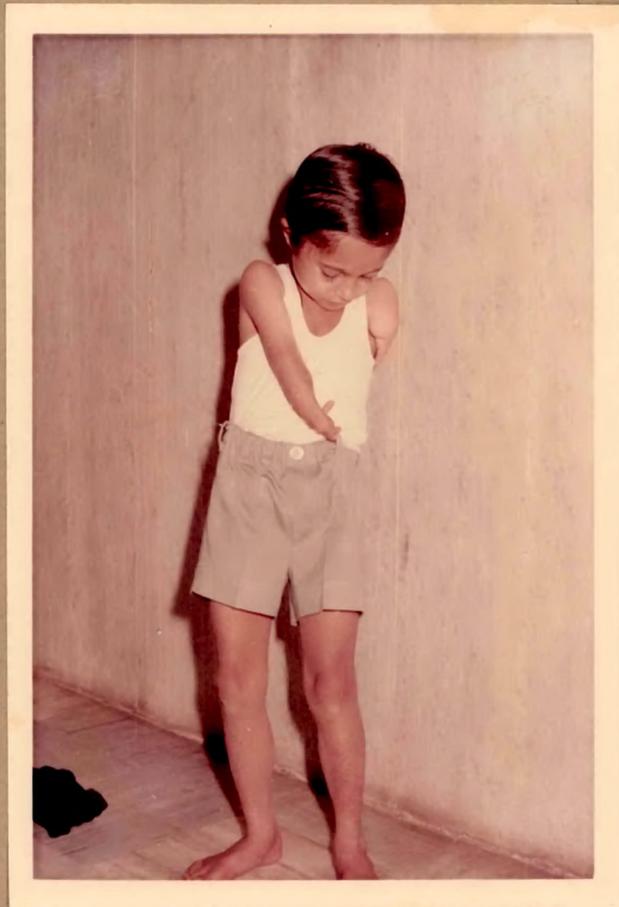
THE SUBJECT USING THE CARRIER ON
THE WAIST BAND OF THE SHORTS.

ADAPTATION FOR SIMULATED FLY

SCALE = 1/4
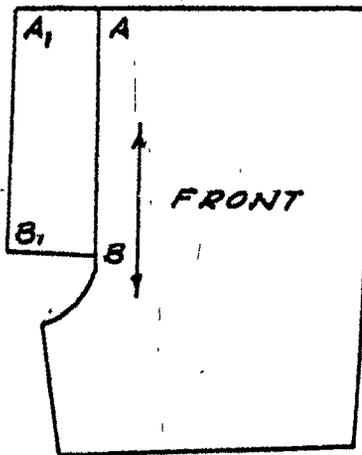
DIAGRAM-10
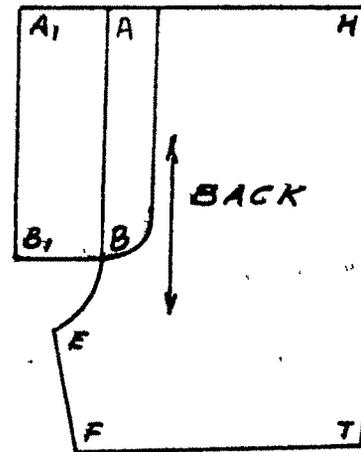
FINAL PATTERN

INSTRUCTIONS FOR SIMULATED FLY:-

$A_1 - B_1 = 5$ cms FROM $A-B$

$A_1 - B_1 = E-F-T-H = $ FINAL PATTERN

CONSTRUCTION OF SIMULATED FLY

FIGURE-5   SCALE = 1/4

FRONT

6 cm OPEN

B

WRONG SIDE

1.

FRONT LEFT   FRONT RIGHT

TURN 1cm
INSIDE AND
STITCH IT

CLIP SEAM

B

PLACE 5 CMS.
WIDE FACING ON
TOP & STITCH
IT FOR 1 cm.

WRONG SIDE

2.
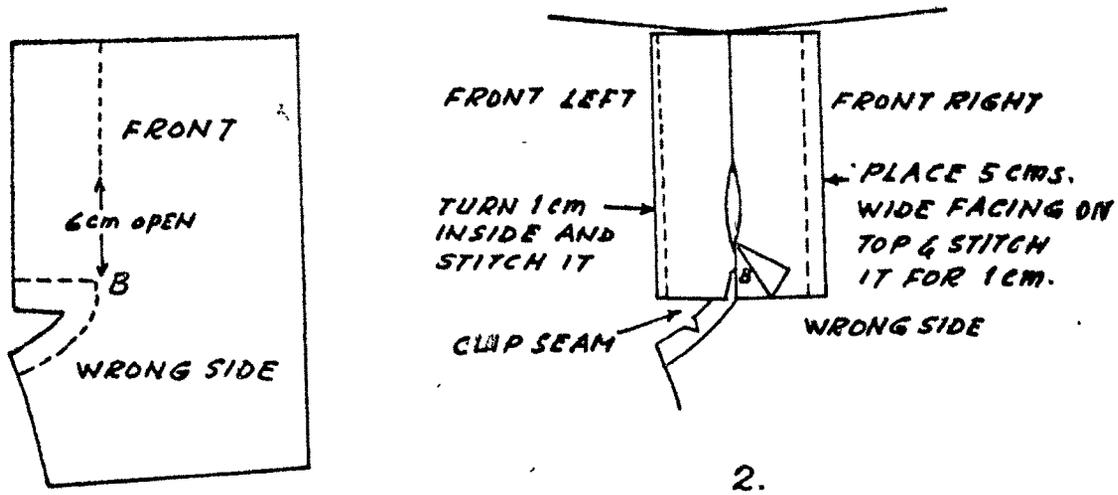
WITH RIGHT SIDE FACING
TOGETHER, STITCH CENTRE
FRONT SEAM, KEEPING
6 CMS OPEN FROM B AS SHOWN.

3 cms

FRONT LEFT   FRONT RIGHT

STITCH FLY
AS SHOWN
UP TO B
THROUGH ALL
THE THICKNESSES

B

WRONG SIDE

3.

FRONT LEFT

FRONT RIGHT

TURN 1 cm OF FACING
INSIDE AND STITCH
AS SHOWN.

3 cms

B   WRONG SIDE

4.

LEFT   RIGHT

FRONT
RIGHT

FRONT
LEFT

BAR TACK
WITH HAND TO
KEEP TWO
SECTIONS
TOGETHER

WRONG SIDE

5.

BARTACK
WITH
MACHINE   RIGHT SIDE

6
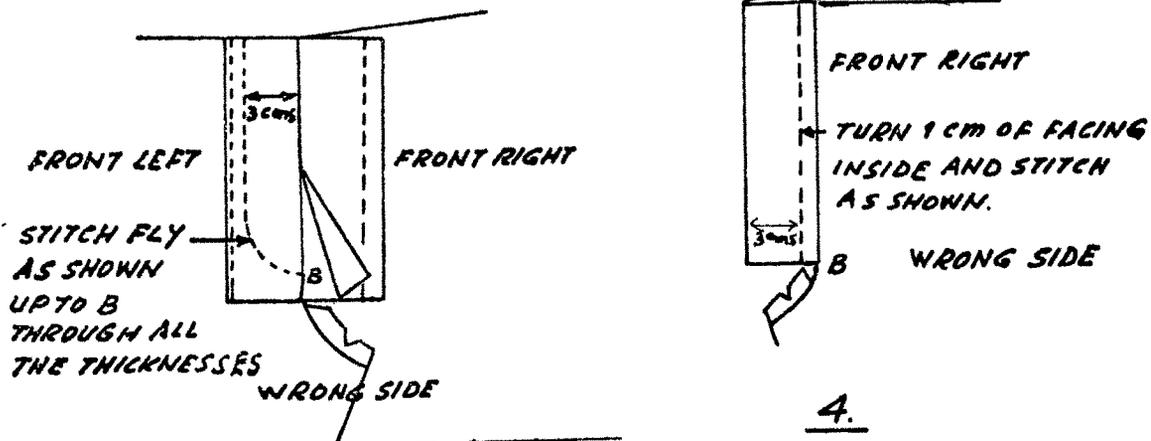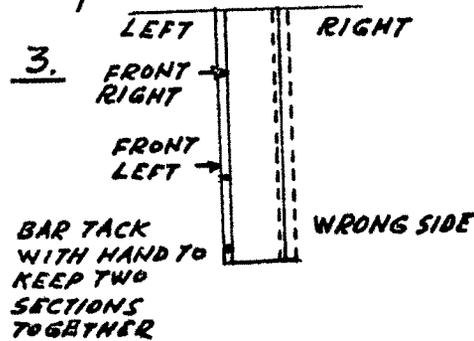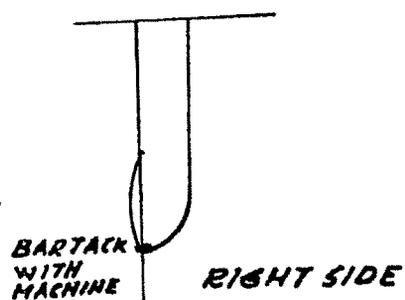
constructed in the shorts to ease the problem. A trial shorts was prepared and given to the subject to see whether he could manage it or not. With effort on the part of the subject to get adjusted with it and after a few trials he could manage toiletting easily. He was very happy about it because he also could use his fly. Earlier, before the simulated fly was made he did toiletting by pulling down the shorts from the waist in the case of plain shorts or lifted the shorts' leg in the case of stretch shorts.

This feature of using simulated fly in the shorts was of great help to the subject because:

(a) He could wear the ordinary cotton shorts or pants without depending on others for fastening buttons or closing a zipper.

(b) Stretch shorts could not be worn for all the seasons due to skin allergy.

This feature also gave normal appearance of shorts with fly which other children wore. A button was sewn at the centre front of waist band (Figure 3) to give a trim effect.

Increase in length of shorts to reach his leg toes

Since he could use his lower limbs effectively to compensate for his upper limbs deformity, he was trained by the investigator to remove or pull down the shorts with the help of his toes.

For this reason the shorts were lengthened by 2 cms (Diagram 11) for the toes to reach the back hem to have a proper grip. First he removed the shorts as much as he could below the waist. Then he leaned against the wall or took support of any object, and pulled the shorts down by using his toes (Plate 3). The use of elastic at the waist helped the shorts to slip down easily.

To make him independent in wearing trousers, a pair of trousers (Diagram 12) was constructed with the same functional features as in the case of already designed shorts.

Drafting instructions for Trousers: (Subject A)

Trace the pattern of front and back of the basic block of shorts (Diagram 9) and adapt trousers with the following instructions:

Measurements

1. Trousers' length = 59 cms
2. Round leg = 36 cms.

Front: (Diagram 12)

$A - A_1$ = Trousers' length = 58 cms

E_2 = Half the measurement from $E-E_1$ = 9 cms

Square down from E_2 to U and up V for crease line.

$U - W$ = Half of E_2-U plus 4 cms = 20.5 + 4 = 24.5 cms

# ADAPTATION TO INCREASE THE LENGTH OF THE SHORTS

SCALE = 1/4
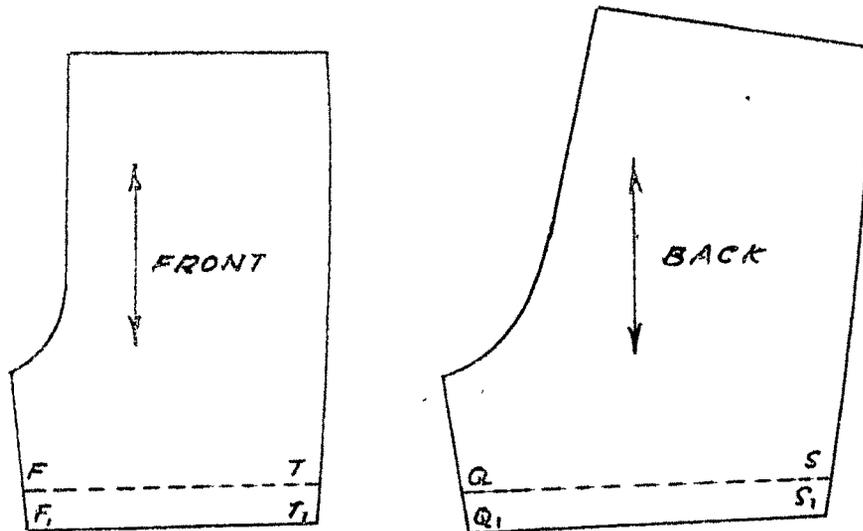
DIAGRAM - 11
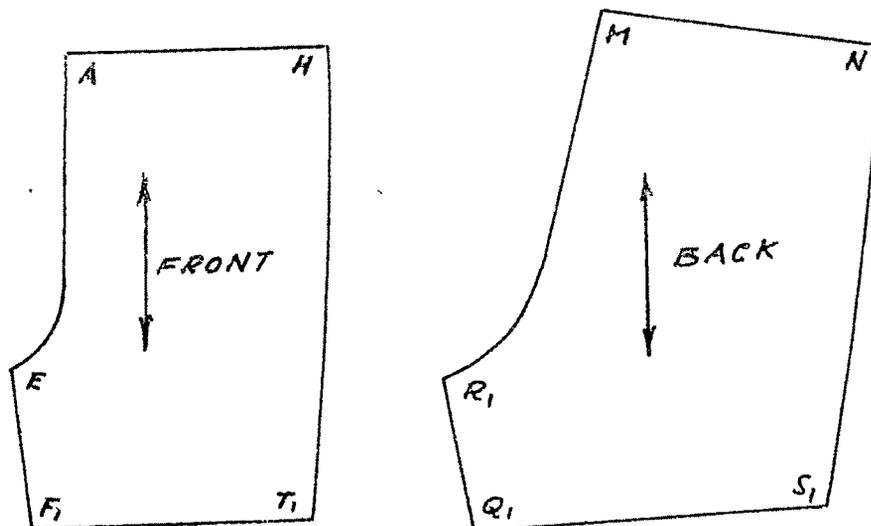
FINAL PATTERN

INSTRUCTIONS:-

$F_1 - T_1$ = 2 CMS FOR FRONT. $Q_1 - S_1$ = 2 CMS FOR BACK

DRAFT OF TROUSERS (SUBJECT-A)

SCALE = 1/4
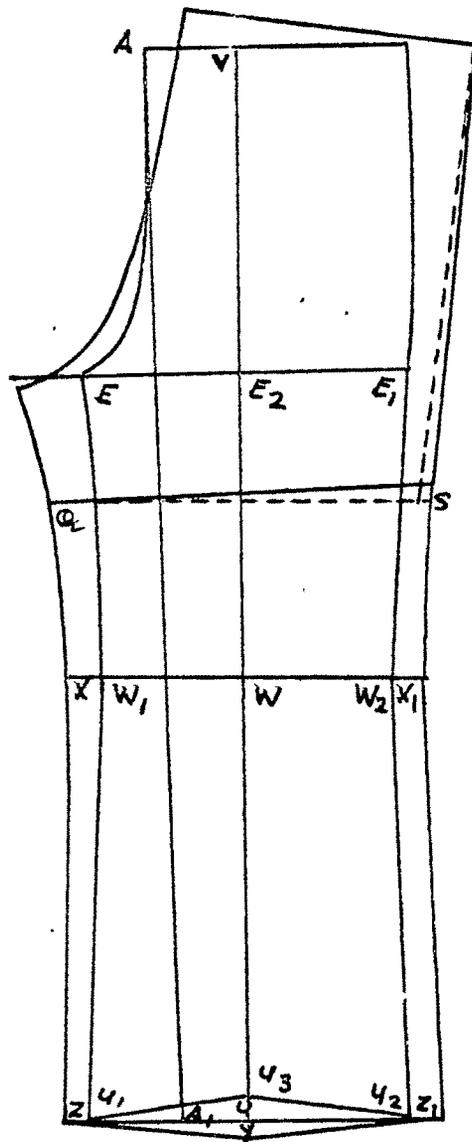
DIAGRAM-12

$U - U_1$ and $U - U_2$ = A quarter round leg = 9 cms

$W - W_1$ and $W - W_2$ = A quarter round leg less 1 cm = 9 - 1 = 8 cms

    Give shape E, W_1 and U_1 and E_1, W_2 and U_2 as illustrated on the diagram.

$U - U_3$ = 1 cm

    Connect U_1, U_3 and U_2.

Back: (Diagram 12)

$W_1 - X$ = 1.5 cm

$W_2 - X_1$ = 1.5 cm

$U - Y$ = 1 cm

$U_1 - Z$ and $U_2 - Z_1$ = 1.5 cm

    Give shape Q, X and Z and S, X_1 and Z_1 as shown on the diagram.

    Connect Z, Y and Z_1.

To overcome the difficulty while removing trousers a cloth loop was sewn on the inner seam of left leg below knee (Figure 6), where his right toe could reach.

To wear it, he leaned against the edge of the bed or wall and slipped into the trousers. Then he pulled it up at the waist as he wore the shorts.

To remove it, first he pulled the trousers down the waist as much as he could do with his hand, he leaned against the wall
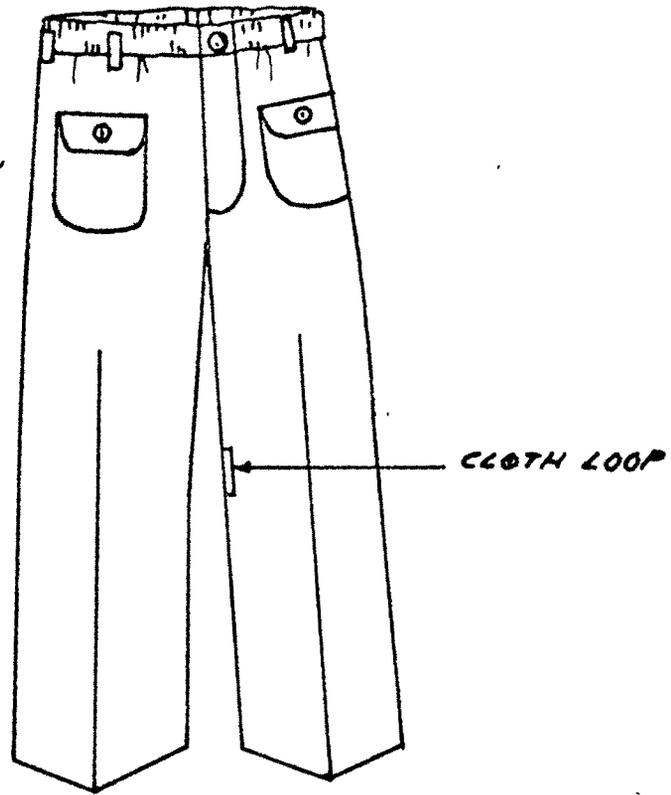
CLOTH LOOP

FIGURE - 6

CLOTH LOOP SEWN ON THE INNER
SEAM OF THE LEFT LEG BELOW
KNEE TO AID IN PULLING TROUSERS
DOWN

PLATE – 3

THE SUBJECT IS PULLING
DOWN THE SHORTS WITH TOES.

PLATE – 4

THE SUBJECT IS PULLING
DOWN TROUSERS BY INSERTING
HIS RIGHT TOE INTO THE LOOP

or took support of any object and inserted his right toe into the loop stitched on the inner seam of the left leg and pulled the trousers down (Plate 4).

Problems while wearing the upper garments were:

1. The centre front of the shirt pulled up in the front at hem becuse of the pigeon chest (Plate 5).

2. He was unable to reach and turn collar in position after wearing a shirt because of his short arm.

3. He was able to fasten small buttons with difficulty only if the buttonholes were large and within his reach. But the major problem was that he was unable to reach and fasten button at chest line located on the centre front of the shirt because of his short arm (Plate 5).

4. He was unable to reach and use pocket located on the left side of the shirt.

To overcome the above problem a shirt was drafted. (Diagram 13, 14, 15).

<u>Drafting instructions for Shirt</u>: (Subject A)

<u>Measurements</u>

1. Shirt length   =   39 cms
2. Round neck   =   25 cms
3. Shoulder width   =   26 cms
4. Chest girth   =   54 cms

PLATE — 5

SUBJECT-A IN H!S NORMAL ATTIRE
OF SHIRT AND STRETCH SHORTS.

DRAFT OF SHIRT (SUBJECT-A)

SCALE = 1/4
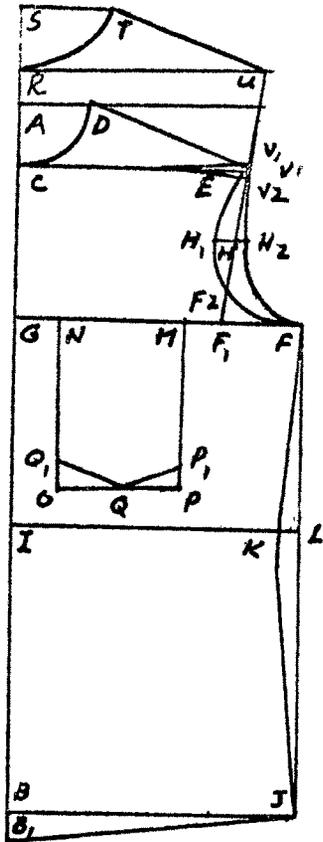
FIGURE - 13
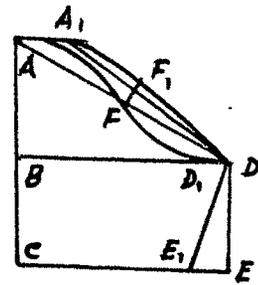
FIGURE - 14
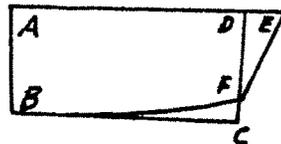
FIGURE - 15

5. Waist girth   = 54 cms

6. Half sleeve length = 12 cms

7. Round sleeve   = 20 cms.

Front: (Diagram 13)

A - B = Shirt length = 41 cms

A - C = One-sixth of the round neck less .5 cm = 4.1 - .5
          = 3.6 cms

A - D = One-sixth of the round neck = 4.1 cms

     Join C to D with a curve for the front neck line.

C - E = Half shoulder width = 13 cms

A - G = One-fourth of the chest girth less 2 cms = 13.5 - 2
          = 11.5 cms

G - F = One-fourth of the chest girth plus 2.5 cms = 13.5 +
          2.5 = 16 cms

G - F_1 = C-E less 1.5 cm = 13.5 - 1.5 = 11.5 cms

     Connect E-F_1.

F_1- H = Half the measurement from F_1 to E = 4.3 cms

H - H_1 = 1 cm

F_1- F_2 = 1.5 cm

     Join E-H_1-F_2-F with curve as in the diagram.

G - I = A-G = 11.5 cms

B - J = G-F = 16 cms

     J is perpendicular to F.

J - L = B-I = 16 cms

K - L = 1.5 cm

Connect F-K-J as indicated in the diagram.

$B - B_1 = 1.5$ cm

Connect B_1-J with a slight curve.

Pocket: (Diagram 13)

F_1- M = 2 cms

M - N = One-eighth of the chest girth = 6.8 cms

N - O = M-N plus 2 cms = 6.8 + 2 = 9.8 cms

O - Q = Half the measurement from O to P = 3.4 cms

$O - Q_1 = 1$ cm and $P-P_1 = 1$ cm

Connect O_1-Q and P_1.

Back: (Diagram 13)

A - R = 2 cms

R - S = One-sixth of the round neck less .5 cm = 4.1 - .5 = 3.6 cms

S - T = One-sixth of the round neck plus 1 cm = 4.1 + 1 = 5.1 cms

Join R to T with a curve for the back neck line.

Square out R.

T - U = D-E = 8.9 cms

H_1- H_2 = 1.5 cm

Join U-H_2-F with a curve as shown in the diagram.

Yoke: (Diagram 13)

Extend C line.

$V - V_1$ and $V - V_2 = .5$ cm on either side of V

Connect $C-V_1$ and $C-V_2$ as indicated on the diagram with a slight curve.

Half Sleeve: (Diagram 14)

A - C = Sleeve length = 12 cms

A - B = One-eighth of the chest girth = 6.8 cms

B - D = One-fourth of the chest girth less 1 cm = 13.5 - 1
= 12.5 cms

C - E = B-D = 12.5 cms

$A - A_1$ and $D - D_1$ = 2.5 cms
Connect A-D and A_1-D.

A - F = Half the measurement from A-D 7.3 cms

$F - F_1$ = 2 cms perpendicular to A-D
Connect $A-A_1-F-D_1-D$ and $A-A_1-F_1$ and D as illustrated on the diagram.

$C - E_1$ = Half of the round sleeve = 11 cms
Connect E_1-D.

Collar: (Diagram 15)

A - B = 6 cms

B - C = Half the round neck plus .5 cm = 11.5 + .5 = 12.cms

A - D = B-C

D - E = 2.5 cms

C - F = 1 cm
Complete the draft according to the diagram.
Readymade collar was also used.

The block of the front collar and sleeve were altered as illustrated in the Diagram 16 to improve the fitting at the centre front of the shirt which pulled up in the front at hem. No changes were made in the back block.

Since the subject had difficulty in reaching and fastening his shirt buttons, the investigator thought that garment without fasteners would be more feasible and ideal. For this reason two slip over the head shirts without fasteners were constructed. These were:

1. A carter neck shirt made of knitted-stretch material (Figure 7).

2. A plain shirt half open in the front and open at sides to allow free movements while wearing (Figure 8).

Both these shirts were unmanageable for him to wear because his only short arm could not reach the head to slip the garment over the head. He was also encouraged to wear them using his lower extremity but found it difficult to manage and could not wear.

Therefore, a button belt was tried on the subject to see his ability and difficulty in manipulating the fasteners. It was found that he could manage press buttons, large buttons and Velcro with less difficulty.

ALTERATION FOR FRONT SLEEVE AND COLLAR

SCALE = 1/4
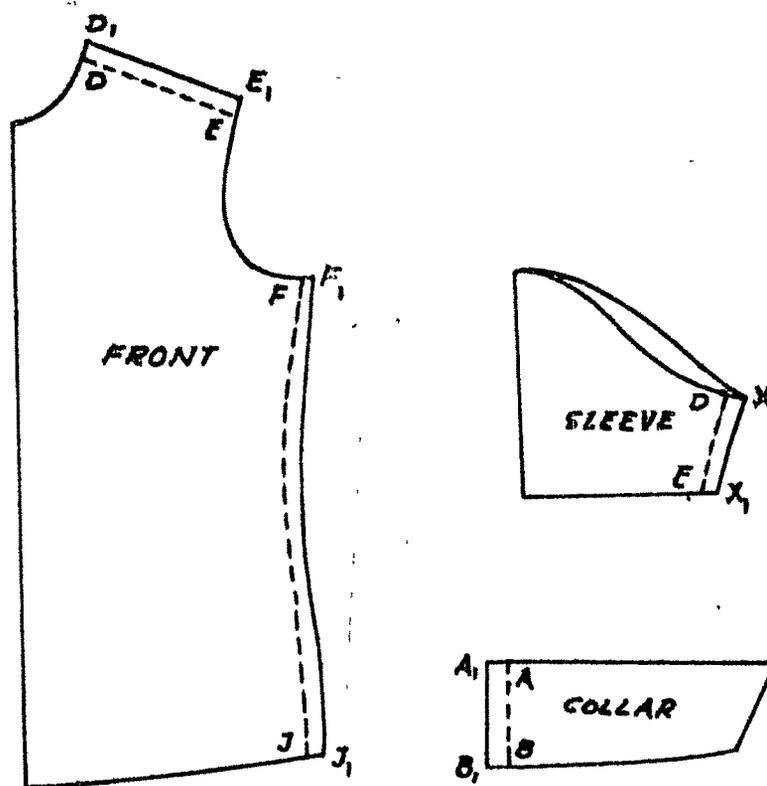
DIAGRAM - 16

INSTRUCTIONS:-

FRONT:

$D_1 - E_1$ = 1 CM FROM D-E

$F_1 - J_1$ = 1 CM FROM F-J

SLEEVE:

$X - X_1$ = 1 CM FROM D-E

COLLAR:

$A_1 - B_1$ = 1 CM FROM A-B

FINAL PATTERN

SCALE = 1/4

FRONT

Labels: D₁, E₁, C, F₁, B₁, J₁

SLEEVE

Labels: A, X, B, X₁

COLLAR

Labels: A₁, E, B₁, F
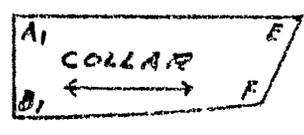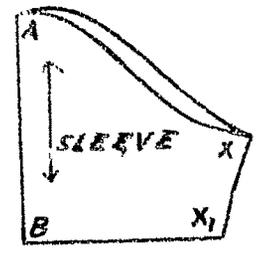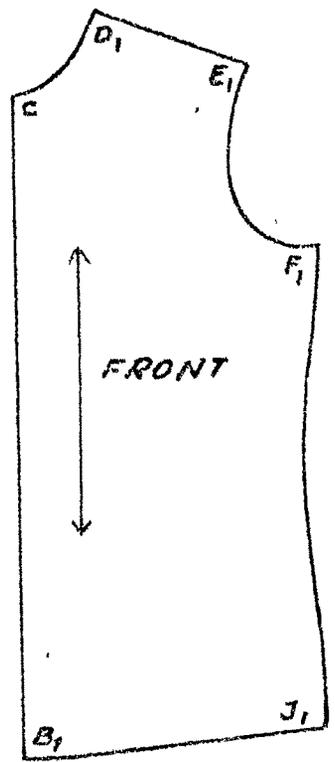
## SLIP OVER THE HEAD STYLE - SHIRTS
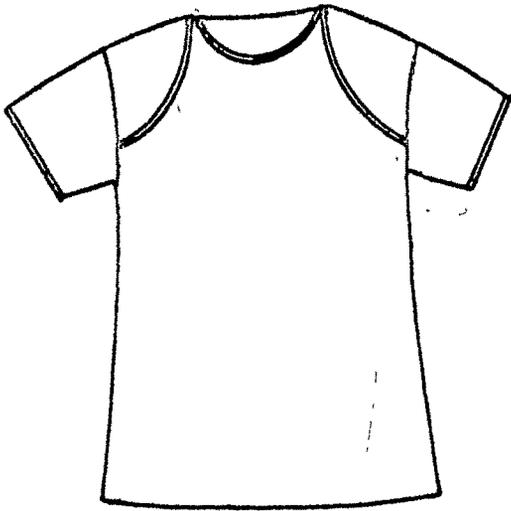
FIGURE - 7

CARTER NECK SHIRT
MADE OF STRETCH MATERIAL
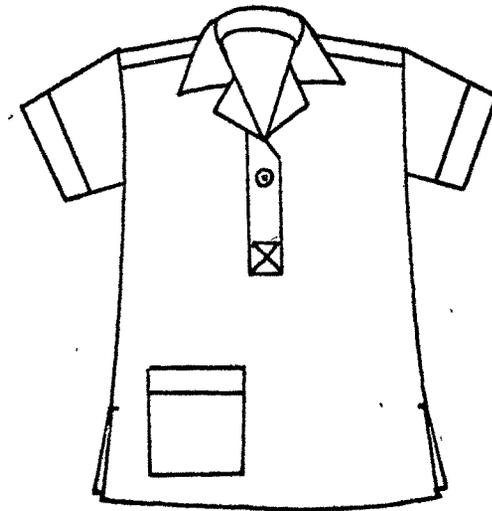
FIGURE - 8

SHIRT HAVING HALF OPEN
IN FRONT AND AT SIDES

To make him independent in wearing upper garments, two front full open shirts with the following alterations were constructed:

Shirt A: With front full open having buttons and buttonholes as fasteners (Figure 9) -

The other features used were:

A press button stitched at the centre back of the collar (Figure 10)

A medium size press button was stitched at the centre back of the collar as shown in the figure, so that the subject could turn the collar in position before wearing or putting on the shirt. This would keep the collar in position while wearing it.

Medium size dome backed buttons with rim (Figure 11)

Small flat buttons which were normally used on his garments were replaced by dome backed medium size buttons. These were selected with a slight rim and stitched keeping a long shank (Figure 11) to ease in grasping and manipulating while fastening.

Enlarged buttonholes

The buttonholes were made slightly loose to slip and remove buttons easily by using his lower limbs (Plate 6).

Minimum number of fastenings

Number of button in the garment was reduced to a minimum of three.
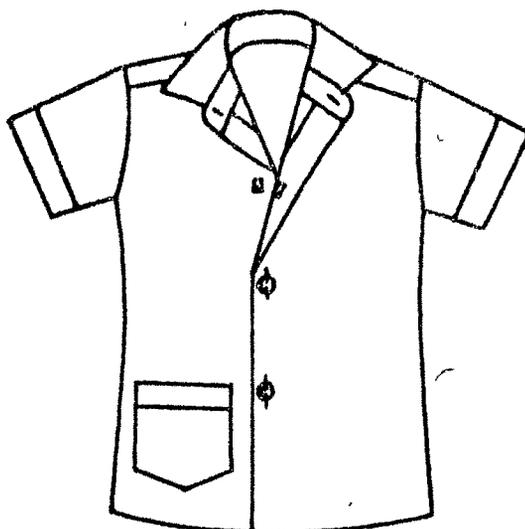
FIGURE - 9

SHIRT - A BUTTON ON CHESTLINE
WAS REPLACED BY 1·5 CM VELCRO
DABS

FIGURE - 11

BUTTON STITCHED
WITH LONG SHANK
TO EASE IN FASTENING
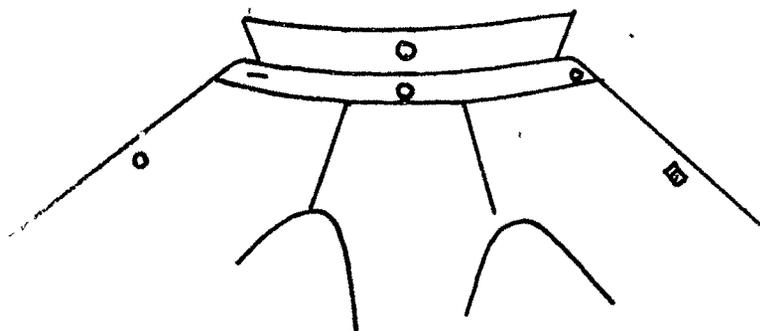
FIGURE - 10

PRESS BUTTON STITCHED AT
THE CENTRE OF THE COLLAR TO
KEEP THE COLLAR IN POSITION
WHILE WEARING

PLATE – 6

THE SUBJECT FASTENING THE BUTTONS
ON THE SHIRT BY USING LOWER
LIMBS.

Change in position of pocket (Figure 9)

His little hand could not reach to use the pocket which was always located at chest line on the left side of the shirt. Therefore, the investigator changed the position of the pocket by placing it on the right side of the shirt below waist so as to be within the subject's easy reach.

Button on chest line replaced by Velcro dabs

The position of button on the chest line was placed low enough in order to be visible and within his reach. But even then he was unable to fasten it due to his handicap. Therefore a Velcro fastener which he could manage was tried. To do this, the button-hole was sewn up and the button was removed. To close the fastening, the button and buttonhole were replaced by 1.5 cm long dabs of Velcro. A button was sewn on the left side on top of the buttonhole for better appearance. This proved successful and manageable by the subject.

Shirt B: With front full open having Velcro as fasteners (Figure 12) -

Velcro, the simple type of fastener which he could manipulate was tried as fastener on his second shirt.

Velcro dabs stitched at the centre of the collar

One cm Velcro dabs were stitched at the centre of the collar instead of press buttons as in Shirt A to keep the collar in position while wearing it.
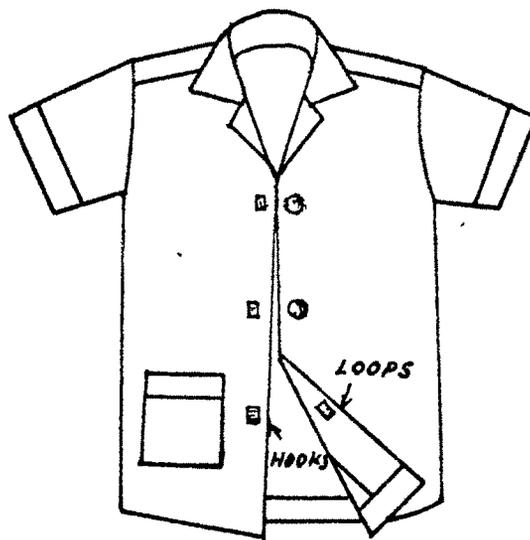
FIGURE - 12

SHIRT - B HAVING VELCRO
AS FASTENERS
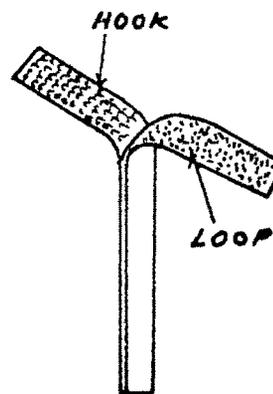
VELCRO FASTENER
CONSISTS OF TWO
NYLON TAPES-ONE WITH
HOOKS AND THE OTHER
WITH LOOPS. WHEN PRESSED
TO GATHER, HOOKS GRIP
THE LOOPS TIGHTLY AND
UNLOCK WHEN PULLED
APART

Use of Velcro dabs as fastenings

Two sections of 1.5 cm long Velcro dabs were stitched on the front over lappings. The top fastening was placed low enough for him to be visible and within the reach to do fastening (Plate 7). The number of fastenings were reduced to the minimum of three only.

Buttons stitched on top of Velcro dabs to give a normal look to the garment

To give the shirt a normal appearance matching buttons were stitched on the left side on top of the Velcro dabs for a trim effect.

Velcro was found more enjoyable and manageable by the subject than the buttons since the two sections of the fastener (Velcro) required minimum finger and hand co-ordination to make it touch each other to close it. He could close and open the shirt in the standing position (Plate 7) and did not use lower extremities.

PLATE — 7

SUBJECT — A TRYING TO
FASTEN TOP VELCRO FASTENER.

Evaluation of Designed Garments

Table 6

Mean scores on lower and upper garments for Subject A

Garment	Ease of wearing	Manipulation of fasteners	Fit of the garment	Appropriateness of the pattern for the disability	Appearance of the child when garment is put on	Its comfort	Ease of removing
				Mean Scores (Range 1-5)			
Lower garments							
Shorts	4.8	4.3	4.5	5.0	4.8	4.6	4.6
Trousers	4.5	4.8	4.3	4.6	4.6	4.6	4.3
Upper garments							
Shirts –							
with button and buttonholes as fasteners	4.1	4.0	4.3	4.3	4.6	4.8	4.6
with Velcro as fastener	4.3	4.5	4.1	4.3	4.6	4.6	4.5

Table 6 show the ratings on lower and upper garments for Subject A. The ratings for shorts ranged from 4.3 to 5, and for trousers from 4.3 to 4.8 which was equal to the opinion "very good". This revealed that the functional features like carriers sewn on the waist band to ease in wearing, increased length of shorts and cloth loop sewn on the inner seam of the leg to ease in removing, elastic at the waist aided to pull garment up and down easily, and simulated fly constructed in shorts and trousers for ease in toiletting helped the subject to gain inddpendence in dressing and undressing himself.

The mean score on manipulation of fasteners for shirt with buttons was 4 and 4.5 for shirt with Velcro fastener which was just a little more than shirt with buttons. This finding revealed that Velcro was more manageable than buttons. It may be noted from the Table 6 that both the shirts were also rated very good on the other criteria. -

When the subject was asked to express his opinion about the garments, he remarked about the shorts, "I do not feel tight in it", which shows he certainly felt comfortable compared to the tight stretch shorts which he normally wore.

He liked simulated fly in his shorts very much and also said that now "I can also do toiletting like other children".

He said that he enjoyed very much wearing shirt tucked in

trousers. He felt proud of himself that he looked very smart in it. Of course shirt was tucked inside the trousers by his mother.

He was overjoyed that he could use pockets in his lower as well as upper garments to put eatables and belongings.

He felt that he could button easily on the designed shirt as compared to the small buttons on the shirts which he normally wore.

He liked Velcro fastener better than button because it was easy for him to manipulate.

Case Study   2

<u>Subject B</u>:

An eleven year old orphan boy suffered from spastic
hemiplegia of left-side who was brought to the Crippled Home,
Baroda, from the State Remand Home, Surat. As his maternal uncle
was not willing to take care of him the court had arranged his
stay at the Crippled Home. He was limpling on left-side while
walking and had speech defect. He was partially dependent on
others for his self-care due to physical problems such as:

1. Use of one hand only

2. Poor balance in standing position

3. Spasticity in the muscles of the affected side.

Inspite of these difficulties he was partially independent
in his dressing but still he faced a few problems while wearing
lower as well as upper garments.

The problems while wearing lower garments were:

<u>Garment fitted tightly on the left side at the back because of</u>
<u>his limping</u>

Due to the body deformity he was limping on the right-side
while walking. As observed by the investigator the shorts which
he wore pulled and became tight and were worn out more on the
left-side as a result of strain due to the body movements.

Shorts (Diagram 17) was drafted and the block of left-side was altered as illustrated in the Diagram 18 to improve the fitting to provide looseness to reduce strain.

Drafting instructions for shorts: (Subject B)

Measurements

1. Short's length = 30 cms
2. Crotch length = 19 cms
3. Waist girth = 68 cms
4. Hip girth = 69 cms
5. Round leg = 39 cms

Front: (Diagram 17)

A - D = Shorts' length = 30 cms

A - C = Waist to crotch plus 2 cms = 19 + 2 = 21 cms

C - B = One-twelfth of the hip girth = 5.8 cms

C - E = One-sixteenth of the hip girth = 4.3 cms

C - G = Half measurements from C to E plus 1 cm at 45°
= 2.1 + 1 = 3.1 cms

Connect E-G-A as indicated on the diagram.

D - F = One-twelfth of the round leg = 3.2 cms

Connect E-F as shown on the diagram.

A - H = One-fourth of the waist girth plus .5 cm = 17 + .5
= 17.5 cms

B - I = One-fourth of the hip girth plus .5 cm = 17.3 + .5
= 17.8 cms

DRAFT OF SHORTS (SUBJECT-B)
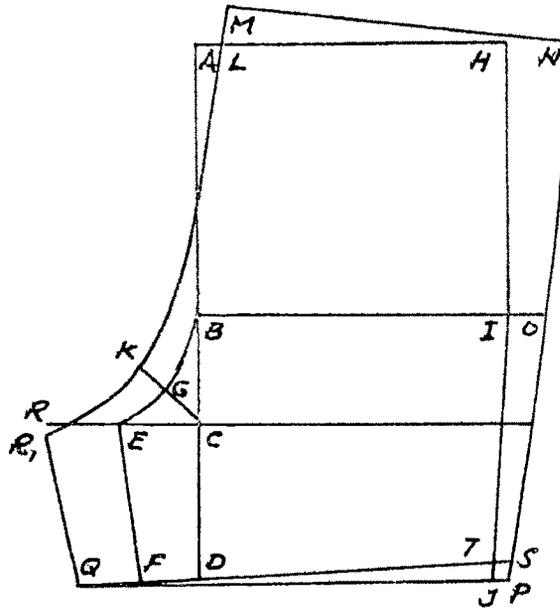
DIAGRAM- 17

ADAPTATION OF LEFT·SIDE BACK

SCALE = $\frac{1}{4}$

BACK LEFT SIDE

R_2 R_1

R_3

1

BACK LEFT SIDE

R_2 R_4 R_3 R_1

2
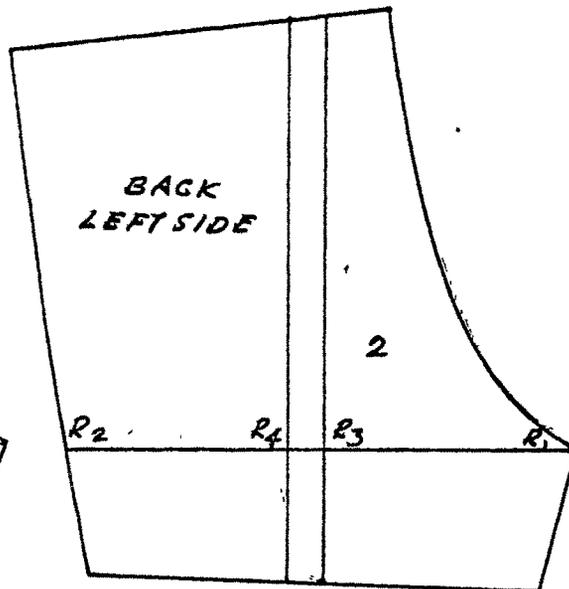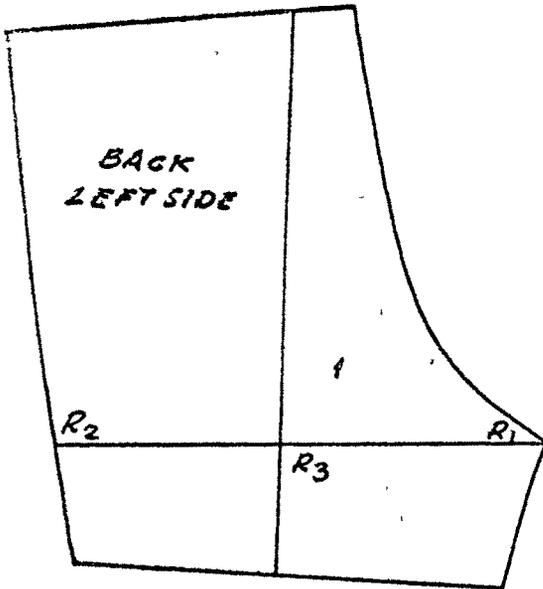
INSTRUCTIONS:-

1. R_3 FROM R_1 = HALF MEASUREMENTS OF R_1-R_2

2. CUT AND SPREAD R_4 FROM R_3 FOR 2 cms.

N   M

BACK LEFT SIDE

3

R_1

S   a
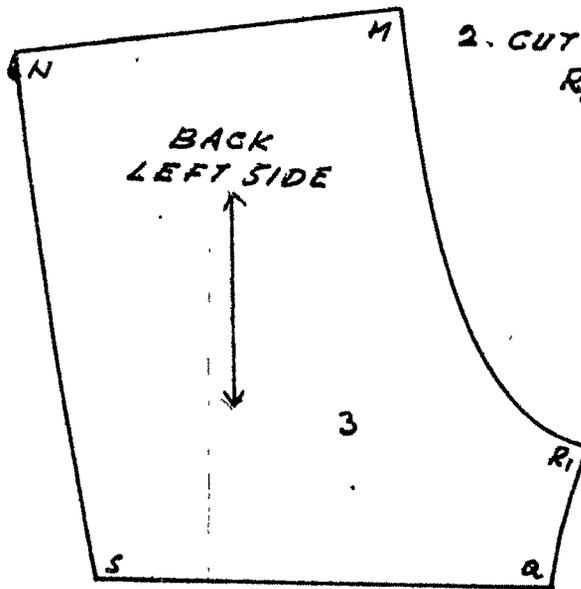
FINAL PATTERN

DIAGRAM - 18

F - J = Half round leg = 19.5 cms

Connect H-I-J as indicated on the diagram.

J - T = 1.5 cm.

Back: (Diagram 17)

The draft is made on that of the Front.

E - R = C-E or one-sixteenth of the hip girth = 4.3 cms

R - R_1 = .5 cm

F - Q = D-F or one-twelfth of the round leg = 3.2 cms

Connect R_1-Q as indicated on the diagram.

G - K = 1.5 cm

A - L = 1.5 cm

Connect R_1-K-L with a curve for crotch and continue to M which is 2 cms from L.

Extend A-H line.

M - N = One-fourth of the waist girth plus 2.5 cms on A-H line
= 17 + 2.5 = 19.5 cms

I - O = 1.5 to 2 cms

J - P = 1.5 cm

Connect N-O-P as indicated on the diagram.

P - S = 1 cm

Connect Q-T-S.

It was difficult for him to hold lower garment in position while
fastening

In order to solve the above problem, first the button belt
left over right was tried to study his exact difficulty while
fastening. However, it was found that he could not pull zipper
up or down. Also it was a little difficult to pull apart to open
Velcro and press button with one hand. The only fasteners which
he could manage were buttons and hooks of any size with less
difficulty.

After considering his difficulty in manipulating the
different fasteners, the investigator made two shorts with
different features to ease in wearing lower garment with one
hand.

Shorts A: With elastic at waist (Figure 13)
Use of elastic as an alternative to fastening:

To make dressing easier for him an elastic was inserted
around the waistband to avoid any fastening at the waist, since
it was difficult for him to do fastening with one hand.

He was taught to wear shorts by leaning against the wall
or sitting on the floor. The affected leg was put first into
the shorts and was pulled to the level below the knee. Then the
unaffected (right) leg was placed in the other leg of the shorts.
Next, he stood without support and pulled shorts up on over the

## SHORTS HAVING ELASTIC AROUND WAIST AND SIMULATED FLY

FIGURE-13

buttocks, first on the unaffected side (right) and then on the affected side (left). Use of elastic at waist prevented the shorts from falling down and retained its position everytime when the subject pulled it up with one hand.

Simulated fly

Simulated fly in the shorts made easier and convenient for him to do toiletting. In addition, this fly gave the shorts a regular appearance of the conventional garment in front which was important to the subject to wear garment that lookslike other boy's shorts.

Shorts B: Having fly with buttons (Figure 14)
Use of buttons as fastener:

Since he could manipulate buttons with one hand the second shorts was constructed with fly having buttons with raised back (Figure 15).

Use of elastic piece in the front as a belt to keep shorts in position while fastening (Figure 14):

In order to simplify the problem of keeping shorts in position at waist while fastening the buttons of fly, a four cms wide elastic equal to the front waist girth was sewn to each side seam as a front belt.

He wore this shorts just as the first shorts but took care to keep elastic in the front which held shorts in place at waist,

ELASTIC
BELT

FIGURE - 15
FLY BUTTON WITH RAISED BACK
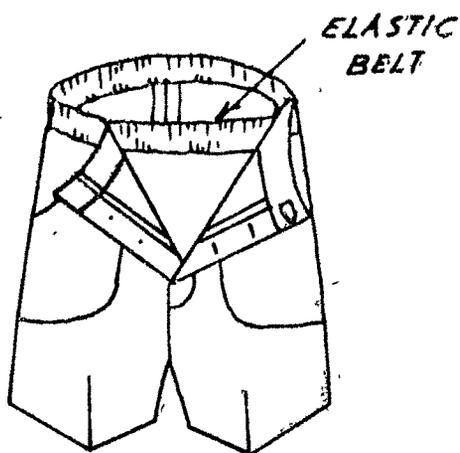
FIGURE - 14

SHORTS HAVING FLY WITH
BUTTONS AND ELASTIC PIECE
SEWN TO EACH SIDE SEAM TO
TO MAKE FRONT BELT
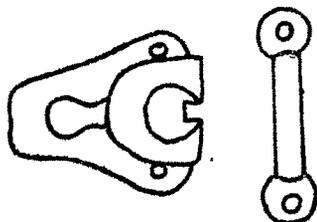
FIGURE - 16

METAL HOOK AND BAR

PLATE – 8

ELASTIC SEWN INSIDE THE FRONT AS A
BELT AIDED TO KEEP SHORTS IN
POSITION AT THE WAIST WHILE
SUBJECT FASTENED BUTTONS WITH
ONE HAND.

preventing it from falling down while subject fastened it with one hand (Plate 8).

The centre button in the front at the waist was difficult for him to pull and to close with one hand. Therefore, a big metal hook and bar (Figure 16) was replaced which he managed well with one hand.

The problem he faced while wearing upper garment was:

1. Difficulty in fastening with one hand.

To make upper dressing easier with one hand a shirt was drafted (Diagram 19) and 3 shirts were made with different openings and fastenings.

<u>Drafting instructions for Shirt</u>: (Subject B)

<u>Measurements</u>

1.	Shirt length	=	48 cms
2.	Round neck	=	30 cms
3.	Shoulder width	=	32 cms
4.	Chest girth	=	68 cms
5.	Waist girth	=	66 cms
6.	Sleeve length -		
	(a) Half	=	17 cms
	(b) Full	=	42 cms
7.	Round sleeve	=	26 cms.

DRAFT OF SHIRT (SUBJECT-B)
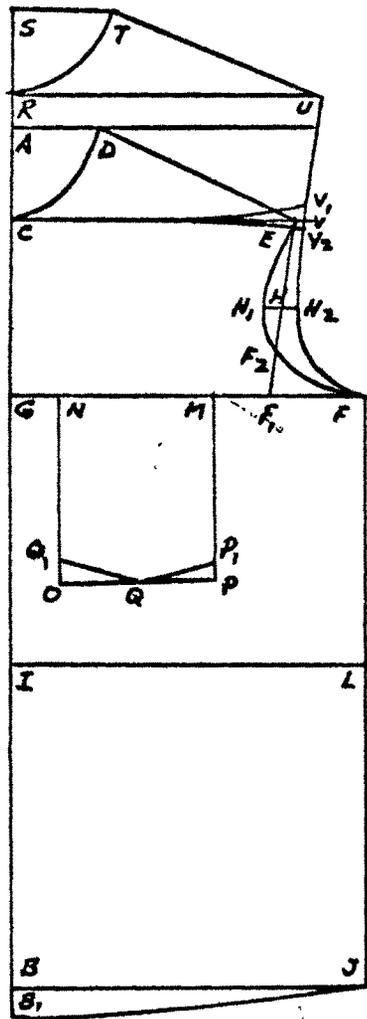

DIAGRAM-19
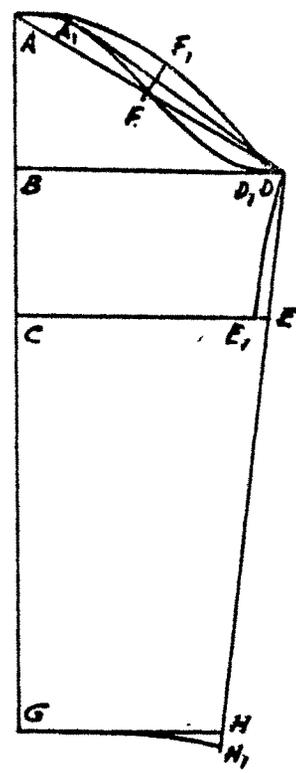
DIAGRAM-20
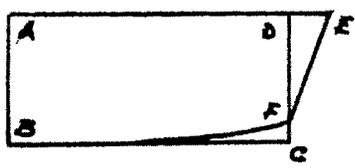
DIAGRAM-22
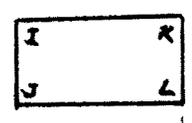
DIAGRAM-21

Front: (Diagram 19)

A - B = Shirt length = 48 cms

A - C = One-sixth of the round neck less .5 cm = 5 - .5
= 4.5 cms

A - D = One-sixth of the round neck = 5 cms

Join C to D with a curve for the front neckline.

C - E = Half shoulder width = 16 cms

A - G = One-fourth of the chest girth less 2 cms = 17 - 2
= 15 cms

G - F = One-fourth of the chest girth plus 3 cms = 17 + 3
= 20 cms

G - F_1 = C-E less 1.5 cm = 16 - 1.5 = 14.5 cms

Connect E-F_1.

F_1- H = Half the measurement from F_1 to E = 5 cms

H - H_1 = 1 cm

F_1- F_2 = 1.5 cm

Join E-H_1-F_2-F with curve as in the diagram.

G - I = A-G = 15 cms

B - J = G-F = 20 cms

J is perpendicular to F.

J - L = B-I = 15 cms

B - B_1 = 1.5 cm

Connect B_1-J with a slight curve.

Pocket: (Diagram 19)

F_1- M = 4 cms

M - N = One-eighth of the chest girth = 8.5 cms

N - O = M-N plus 2 cms = 8.5 + 2 = 10.5 cms

O - Q = Half the measurement from O to P

O - Q_1 = 1 cm and P-P_1 = 1 cm

Connect O_1-Q-P_1.

Back: (Diagram 19)

A - R = 2 cms

R - S = One-sixth of the round neck less .5 cm = 5 - .5
= 4.5 cms

S - T = One-sixth of the round neck plus 1 cm = 5 + 1 = 6 cms

Join R to T with a curve for the back neckline.

Square out R.

T - U = D-E = 12 cms

H_1- H_2 = 1.5 cm

Join U-H_2-F with a curve as shown in the diagram.

Yoke: (Diagram 19)

Extend C line.

V - V_1 and V - V_2 = 5 cms on either side of V.

Connect C-V_1 and C-V_2 as indicated on the diagram with a
slight curve.

Half Sleeve: (Diagram 20)

A - C   =   Sleeve length = 17 cms

A - B   =   One-eighth of the chest girth = 8.5 cms

B - D   =   One-fourth of the chest girth less 2 cms = 17 - 2
            = 15 cms

C - E   =   B-D = 15 cms

A - A_1 and D - D_1 = 2.5 cms

   Connect A-D and A_1-D.

A - F   =   Half the measurement from A-D = 8.5 cms

F - F_1 =   2 cms perpendicular to A-D

   Connect A-A_1-F-D_1-D and A-A_1-F_1 and D as illustrated on
   the diagram.

C - E_1 =   Half of the round sleeve = 13 cms

   Connect E_1-D.

Full Sleeve: (Diagram 20)

G - A   =   Full sleeve length - Cuff width = 42 - 5 = 37 cms

H - G   =   One-sixth of the chest girth = 11.3 cms

   Connect D-H and extend .5 to H_1.

   Connect G-H_1 with a slight curve.

Cuff: (Diagram 21)

I - J   =   Cuff width = 5 cms

K - I   =   One-eighth chest girth plus 1 cm = 8.5 + 1 = 9.5 cms

L - K   =   J-I = 5 cms.

Collar: (Diagram 22)

A - B = 6 cms

B - C = Half the round neck plus .5 cm = 15 + .5 = 15.5 cms

A - D = B-C = 15.5 cms

D - E = 2.5 cms

C - F = 1 cm

Complete the draft according to the diagram.

The subject expressed a desire to wear a full sleeve shirt, therefore, a full front open bush-shirt having full sleeve (Shirt A) was made to avoid the difficulty of tucking the shirt into the shorts with one hand.

To make the buttoning process easier for him with one hand, medium size dome backed buttons with raised rim were used instead small flat buttons. These were stitched with long shank to ease in grasping with one hand while fastening. Buttonholes were kept little larger for buttons to slip through easily.

The main problem he faced while wearing it, was difficulty in fastening the cuff on the unaffected hand, because he could not use his affected hand at all. To overcome this difficulty, an elastic cufflink was made with rubber band as shown in Figure 17. Buttonholes on the right cuff were kept a little smaller than the button to prevent button being pulled open when under strain while wearing.

ELASTIC CUFF LINK

TWO BUTTONS CONNECTED
BY A RUBBER BAND OR
ELASTIC

CUFF LINK WHEN
STRETCHED
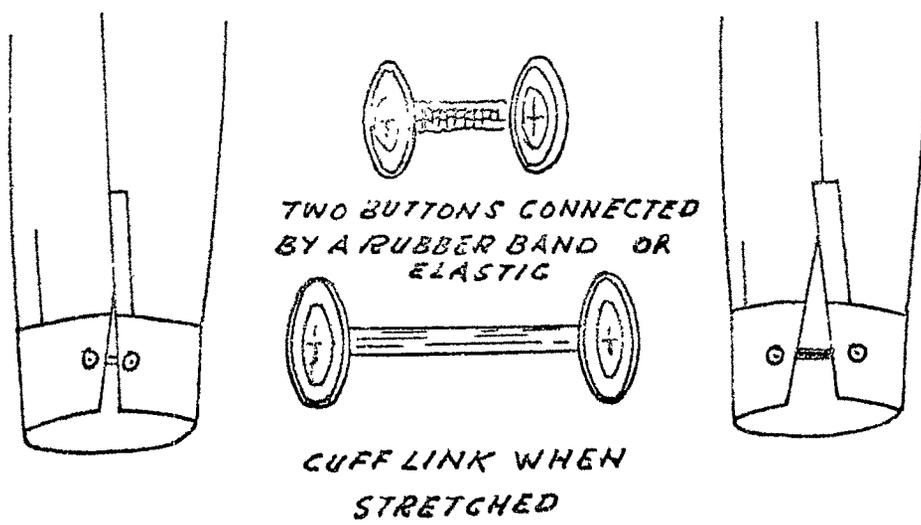
FIGURE - 17

To wear the shirt, he stood without support. First he inserted the affected arm (left) through sleeve. Then he brought the shirt round the back over the unaffected (right) shoulder with his unaffected hand (right) and inserted good arm into the sleeve. Here pre-closed cufflink with elastic which expanded as his hand was pushed through the cuff. Cuff on affected hand (left) was then fastened with the good hand.

To take off, first the cuff on affected hand (left) was unfastened with a good hand (right). Then the shirt was pushed down at the back and the unaffected hand (right) was shaken to pull out sleeve and then the sleeve on the affected arm (left) was pulled out.

The other two shirts which could be slipped on over the head - of which one had button and loop made of cloth tape (Shirt B) as fastener in the center front (Figure 18) (Plate 9), and the other shirt which had expandable neck (Shirt C) entirely free of any sort of fastening (Diagram 23) (Figure 19) (Plate 10) were made to ease in dressing with one hand.

Extra fullness of 5 cms was added at the centre back as shown in the Diagram 24 by means of a box pleat (Figure 20) to allow ease in greater freedom of arm movements while dressing with one hand. They were also kept open at sides (Figure 20) to allow more room to get in and out of the shirt easily. Side seams
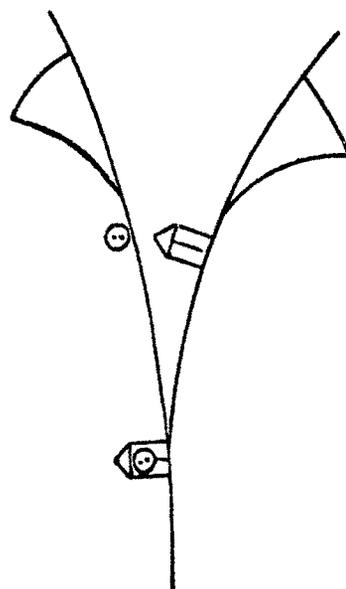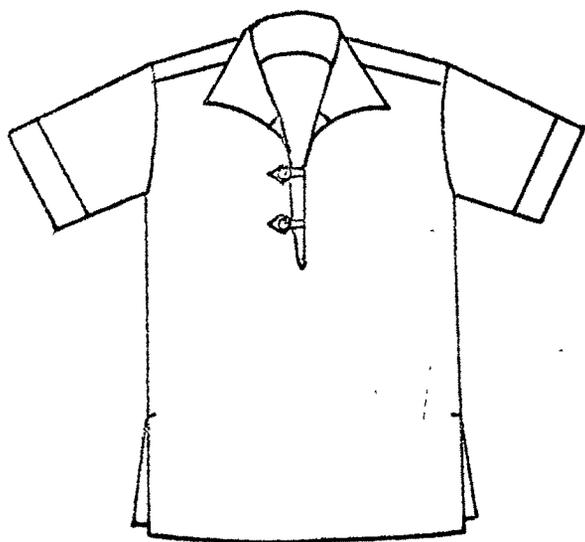
SLIP OVER THE HEAD SHIRT
WITH BUTTON AND LOOP AS
FASTENERS

LOOP BUTTON HOLE
MADE OF CLOTH TAPE

FIGURE - 18

PLATE – 9

SUBJECT – B CLOSING LOOP
FASTENER, WITH ONE HAND.

ADAPTATION FOR EXPANDABLE NECK
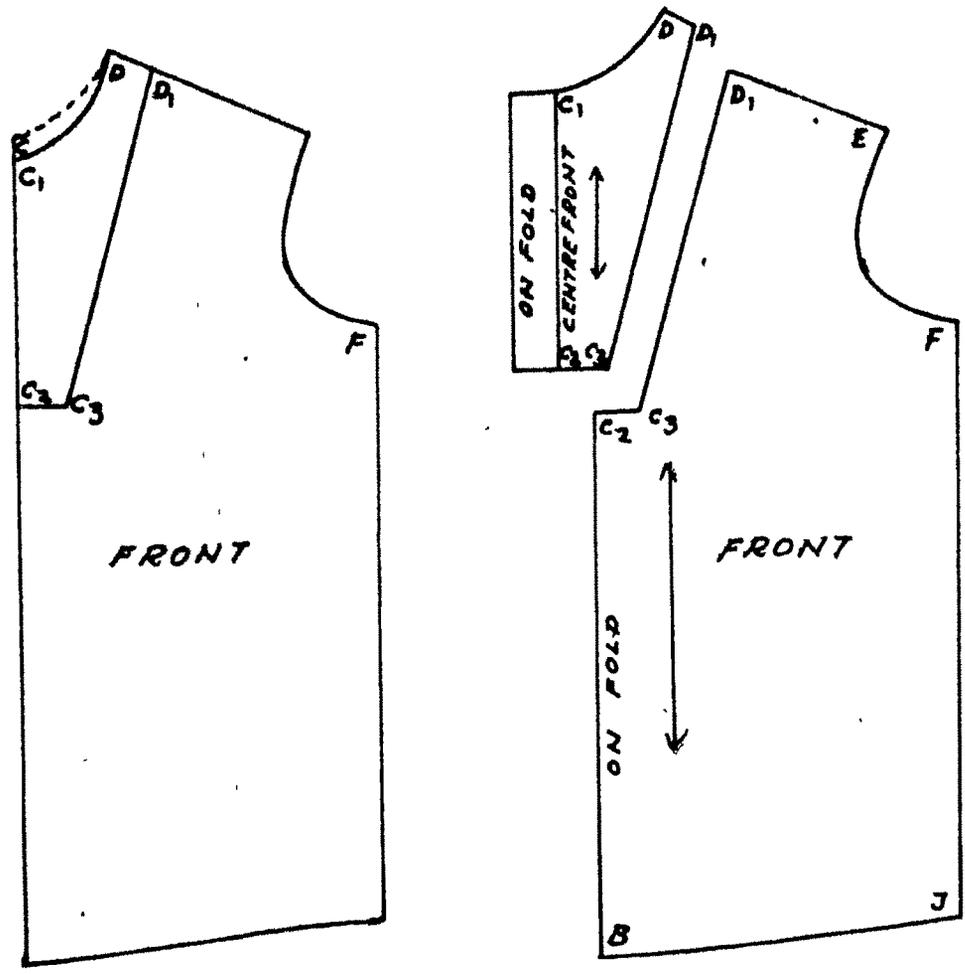
FINAL PATTERN

DIAGRAM - 23

INSTRUCTIONS

C_1 FROM C = 1·5 CMS. CONNECT C_1 -D WITH CURVE FOR FRONT NECK LINE

D_1 FROM D = 2·5 CMS.

C_2 FROM C_1 = 15 CMS.

C_3 FROM C_2 = 2·5 CMS. CONNECT D_1 - C_3
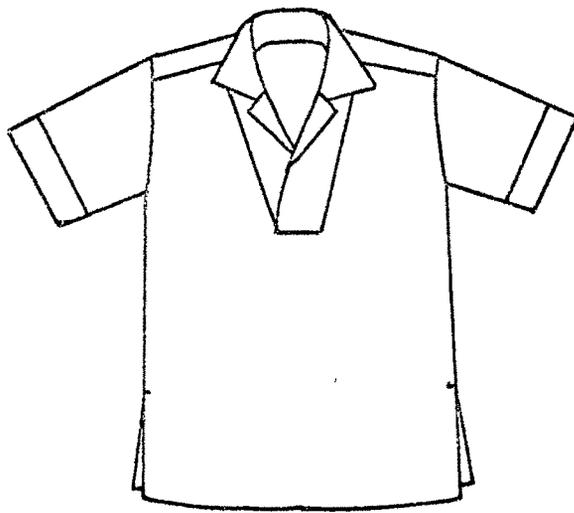
FIGURE - 19

SHIRT WITH EXPANDABLE NECKLINE
ENTIRELY FREE OF FASTENING

PLATE – 10

SLIP OVER HEAD
SHIRT WITHOUT FASTENERS.

ALTERATION AT THE CENTRE BACK

BACK

BACK

X C

X₁ B

X V₂

F

X₁ J

FINAL PATTERN
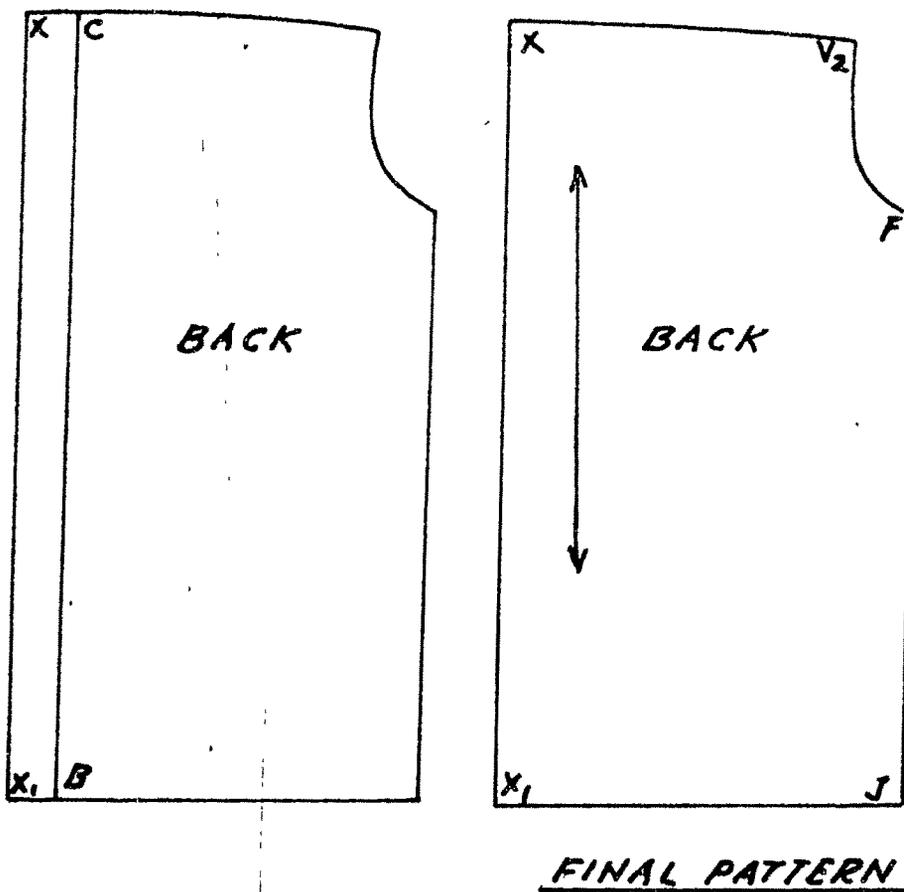
DIAGRAM - 24

INSTRUCTIONS: -

X - X₁ = 2.5 cms FROM C - B
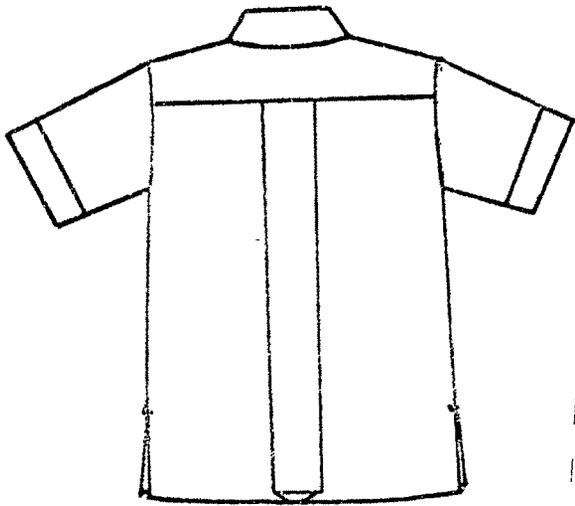
FIGURE· 20

FULLNESS AT THE CENTRE
BACK AND OPEN AT SIDE
SEAMS TO ALLOW ROOM FOR
FREEDOM OF MOVEMENTS
WHILE DRESSING
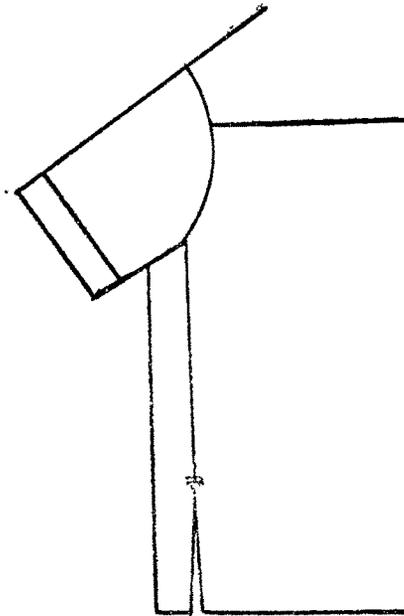
FIGURE - 21

SIDESEAMS WERE
STRENGTHENED WITH
STITCHING TO PREVENT
FROM TEARING

were strengthened with 2 rows of stitching as shown in Figure 21 to prevent it from tearing.

Neck openings were kept larger than the actual circumference of the head to give additional room for the head to slip through easily.

To wear a shirt, over the head, he took support or leaned against the wall with his back. First he inserted affected arm (left) and pulled shirt up on the arm above the elbow with good hand. Then unaffected arm (right) above the elbow. He gathered the back of the shirt with good hand and pulled shirt up to slip on over the head. Next he stood without support and adjusted the shirt at collar.

To remove it, first he unfastened the button, then the back of the shirt was gathered up at the back. He bent his head forward and pulled the shirt over the head. The good arm was removed first from the sleeve and then the sleeve on the affected arm (left) was pulled out.

Evaluation of Designed Garments

Table 7

Mean scores on lower and upper garments for Subject B

Garment	Ease of wearing	Manipula-tion of fasteners	Fit of the garment	Appropria-teness of the pattern for the disability	Appear-ance of the child when garment is put on	Its comfort	Ease of removing
				Mean Scores (Range 1-5)			
Lower garments							
Shorts -							
with elastic around waist	4.5	4.6	5.0	4.8	4.6	4.8	4.6
fly with button	4.5	4.6	4.8	4.6	4.6	4.5	4.6
Upper garments							
Shirts -							
full sleeve with elastic cufflink	3.8	4.5	4.6	4.8	4.6	4.6	4.6
slip over the head with button and cloth loop as fastener	4.6	4.8	4.8	4.6	4.8	4.8	4.6
slip over the head having expandable neckline	4.5	4.8	4.8	4.8	4.8	4.6	4.8

Table 7 shows the ratings on lower and upper garments for subject. The ratings, for shorts having elastic around the waist ranged from 4.5 to 5, and for shorts with button fly from 4.5 to 4.8 which was equal to the opinion "very good". These results show that simple additions to the garment such as an elastic belt in the front enabled the subject to wear shorts or lower garment with one hand.

The mean score on ease of wearing for shirts to be put on over the head was greater than shirt with full open having elastic cufflink at sleeve (Table 7) because it was difficult for him to close the cufflink.

Case Study 3

<u>Subject C:</u>

A nine year old girl had hemiplegia. Her right-side was affected by spastic paralysis. She attended Crippled Home School. The physical problems which affected her ability to dress herself were:

1. Insufficient fine co-ordination of the fingers of the affected hand.

2. Spasticity in the muscles of right side.

3. Confusion.

4. Fear.

She normally wore dresses with back three-fourth right over left overlapping which had either small hooks and eyes or small buttons and horizontal buttonholes. These dresses were either tailor-made or were ready-made. She normally wore her dress by slipping it through the legs. Her mother specially preferred for her the clothes with back openings with the intention that it was easier and convenient for her to fasten them.

It was observed that the problem with fastening was mainly due to:

1. The back opening which even a normal person cannot close with ease.

2. Lack of encouragement or an opportunity to do fastening herself.

Before making any garment, her ability in manipulating the fasteners was tested on the button belt. It was found that she could not use her right hand for fine manipulation due to deformity. Since she used her left hand more for other activities, therefore, a belt was turned to have left over right overlapping to see her ability in doing fastening with left hand. However it was amazing to see that with training to fasten different fastenings on the belt, practice on the part of the subject and a little support from her affected hand eventually she could manipulate press buttons, hooks, buttons, Velcro and a zipper. The only fasteners that she could not manage were small buttons and ties. Yet the investigator tried to teach right over left fastening but it was difficult for her to do it due to her physical deformity.

After studying her difficulties in fastening the following alterations were made in her garments. These were:

1. Front opening with left over right overlap to ease in the task of fastening.

2. Use of manageable fasteners.

In order to accomplish upper dressing a blouse was drafted
(Diagram 25, 26, 27).

Drafting instructions for Blouse: (Subject C)

Measurements

1. Blouse length = 40 cms

2. Round neck = 28 cms

3. Bust girth = 60 cms

4. Waist girth = 56 cms

5. Shoulder to waist length = 28 cms

6. Shoulder width = 28 cms

7. Sleeve length = 17 cms

8. Round sleeve = 24 cms.

Front and Back: (Diagram 25)

A - D = Blouse length = 40 cms

A - B = One-fourth of the bust girth = 15 cms

A - C = Highest shoulder to waist level = 28 cms

E - A = One-sixth of the round neck plus 1 cm = 4.6 + 1
= 5.6 cms

F - A = One-sixth of the round neck = 4.6 cms

G - A = 1 cm

Join E-F with a curve for the front neckline and G-F
for the back neckline.

H - A = Half shoulder width = 14 cms

DRAFT OF BLOUSE (SUBJECT·C)

SCALE = 1/4
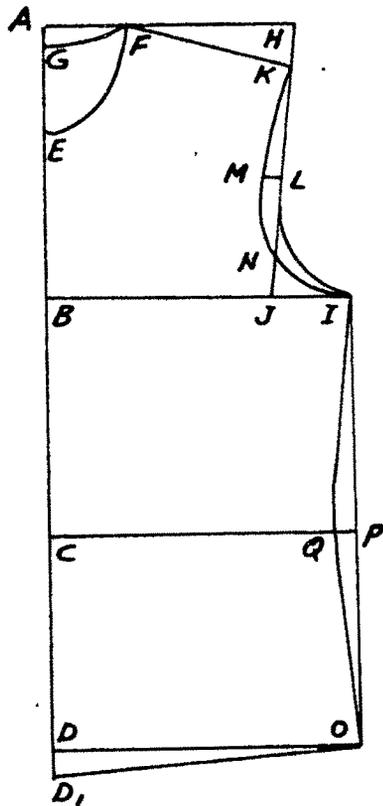
DIAGRAM - 25
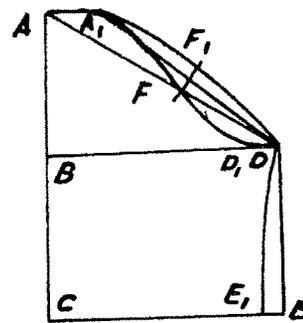
DIAGRAM - 26
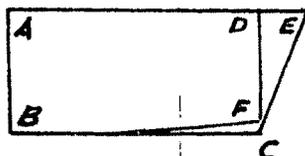
DIAGRAM · 27

I - B = One-fourth of the bust girth plus 2 cms = 15 + 2
= 17 cms

B - J = A-H less 1.5 cm = 14 - 1.5 = 12.5 cms

Connect H-J.

H - K = 2 cms

Connect F-K.

L - J = Half the measurement from J-K = 6.5 cms

M - L = 1 cm

N - J = 2 cms

Connect K-M-N-I for the front scye and K-L-I for the back
scye as indicated on the diagram.

O - D = B-I = 17 cms

O is perpendicular to I.

O - P = D-C = 12 cms

Q - P = 1.5 cm

Connect I-Q-O as indicated on the diagram.

D_1- D = 1.5 cm

Join D_1-O with a slight curve.

Sleeve: (Diagram 26)

A - C = Sleeve length = 17 cms

A - B = One-eighth of the chest girth = 7.5 cms

B - D = One-fourth of the chest girth less 2 cms = 15 - 2
= 13 cms

C - E = B-D = 13 cms

$A - A_1$ and $D - D_1$ = 2.5 cms

Connect A-D and A_1-D.

$A - F$ = Half the measurement from A-D = 7 cms

$F - F_1$ = 2 cms perpendicular to A-D

Connect $A-A_1-F-D_1-D$ and $A-A_1-F_1$ and D as illustrated on the diagram.

$C - E_1$ = Half of the round sleeve = 12 cms

Connect E_1-D.

Collar: (Diagram 27)

$A - B$ = 6 cms

$B - C$ = Half of the round neck plus .5 cm = 14 + .5 = 14.5 cms

$A - D$ = B-C = 14.5 cms

$D - E$ = 2.5 cms

$C - F$ = 1 cm

Complete the draft according to the diagram.

Three blouses and a dress were tried with different fasteners to make her independent in fastening process.

Blouse A:

Slip over the head blouse with three quarter length opening having a visible zipper sewn at the centre front (Figure 22).

Blouse B:

Full front open with Velcro fastener (Figure 23).

BLOUSES

SLIP OVER THE HEAD WITH ZIPPER

FIG. 22

FRONT FULL OPEN
WITH VELCRO FASTENER

FIGURE - 23

FRONT FULL OPEN HAVING
PRESS BUTTONS AS FASTENER

FIGURE - 24

A front full length left over right opening with 3 Velcro dabs of 1.5 cm were stitched under the buttons. Buttons were used on the left overlap for trim effect and also to indicate the position of the fastener.

Blouse C:

Full front open having press buttons (Figure 24).

A front full length left overlap opening with three medium size press buttons as fastener.

The three quarter front opening blouse with zipper worn over the head was not liked by the subject. She became frustrated when she could not pull it down over her face. However, the full front open blouses were easy for her to put on and take off. She enjoyed fastening them. She could even manage independently the top most fastening since her sense of touch of her left hand was good. She often had difficulty to match them up evenly. She was made to stand in front of a mirror and the investigator stood behind her to teach her to match the fastenings accurately. She was taught to match Velcro fastener from top evenly and then to line up others. For press buttons to begin fastening with the lowest first and then the others which solved her problem.

Dress: (Figure 25)

A dress (Diagram 28) was made with three quarter length left over right overlap opening in the front. The placket was
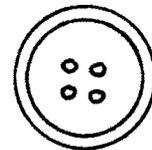
FIGURE - 26
BUTTON WITH RAISED
RIM

FIGURE - 25

A DRESS WITH LONG PLACKET IN
FRONT FOR EASY DRESSING

ADAPTATION OF DRESS FROM BLOUSE

(DIAGRAM - 25)

SCALE = 1/4

FRONT YOKE

8 CM

BACK YOKE

8 CM

GATHERS
ONE AND HALF OF THE
FRONT YOKE WIDTH

FRONT

ELASTIC CASING

52 CMS

GATHERS
ONE AND HALF OF THE
BACK YOKE WIDTH

BACK

ELASTIC CASING

52 CMS
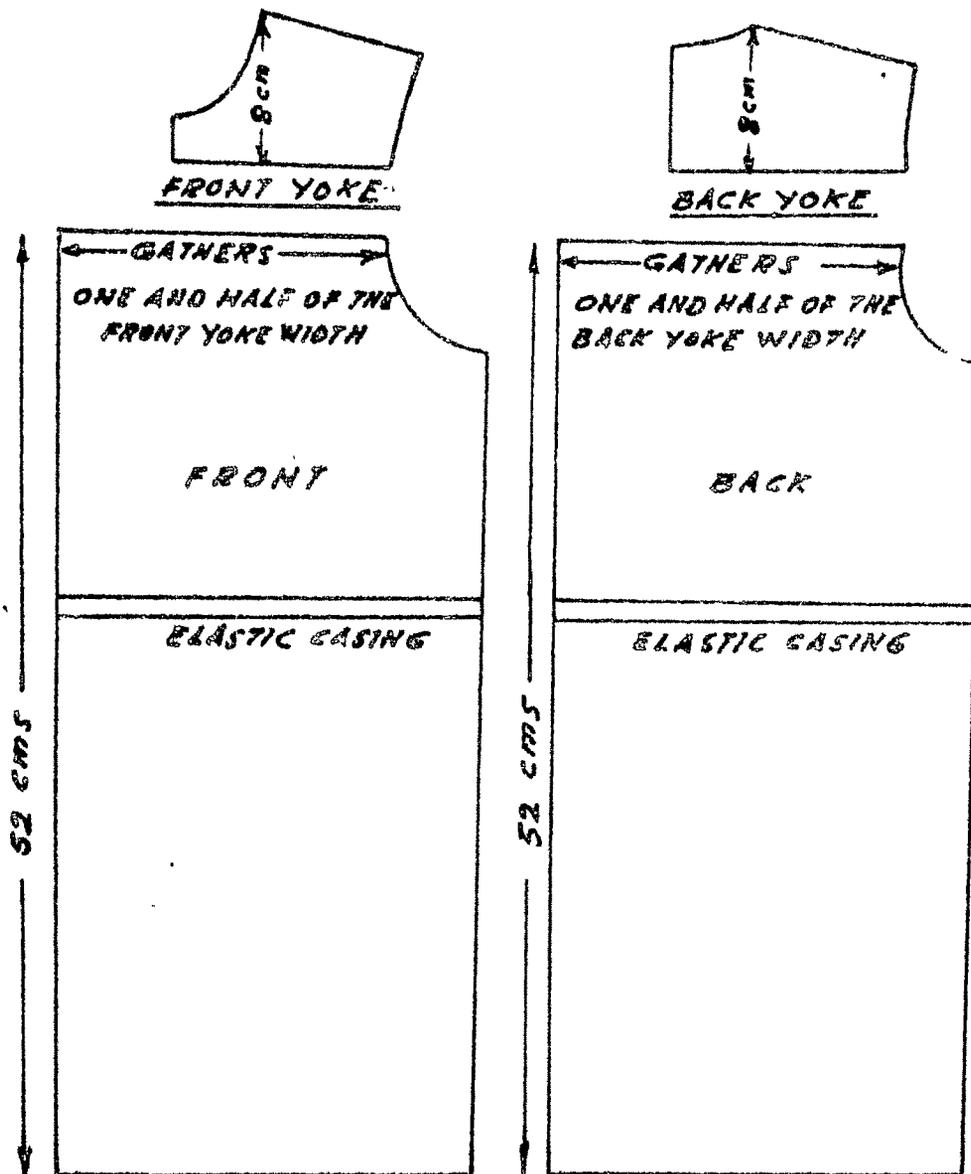
DIAGRAM - 28

DRESS LENGTH = 60 CMS

SLEEVE AND COLLAR AS IN BLOUSE (DIAGRAM 26-27)

PLATE — 11

A DRESS WITH LEFT OVER RIGHT OVER-
LAP PLACED IN THE FRONT TO
EASE THE TASK OF FASTENING.

kept long enough for her to get in and out of the dress easily. It had a low roll collar. Big buttons of 2 cms diameter with raised rim (Figure 26) which she could manipulate were stitched with a thread shank to ease in handling while fastening. Button-holes were kept loose to make buttons slip easily. The top fastening was placed low enough for her to see while fastening (Plate 11).

To make lower dressing easier skirt was drafted (Diagram 29, 30). Three skirts with different fasteners were tried.

Drafting instructions of basic Skirt: (Subject C)

Measurements

1. Skirt length   =   35 cms
2. Waist girth   =   56 cms
3. Hip girth   =   62 cms.

Front and Back: (Diagram 29)

A - C = Skirt length = 35 cms

B - A = One-eighth hip girth plus 2 cms = 7.8 + 2 = 9.8 cms
     Extend A-B-C on right.

D - A = A quarter of the waist girth plus .5 cm = 14 + .5
        = 14.5 cms

E - B = A quarter of the hip girth plus .5 = 15.5 + .5
        = 16 cms

F - C = E-B = 16 cms
     Connect F-E-D and continue to D_1 which is 1 cm from D.

     Join D_1-A as shown in the diagram.

DRAFT OF BASIC SKIRT (SUBJECT-C)

SCALE = 1/4
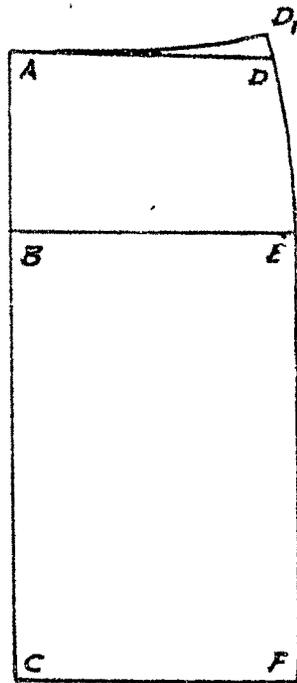
DIAGRAM - 29

ADAPTATION OF FLARED SKIRT FROM BASIC SKIRT

(DIAGRAM-29)

SCALE = 1/4
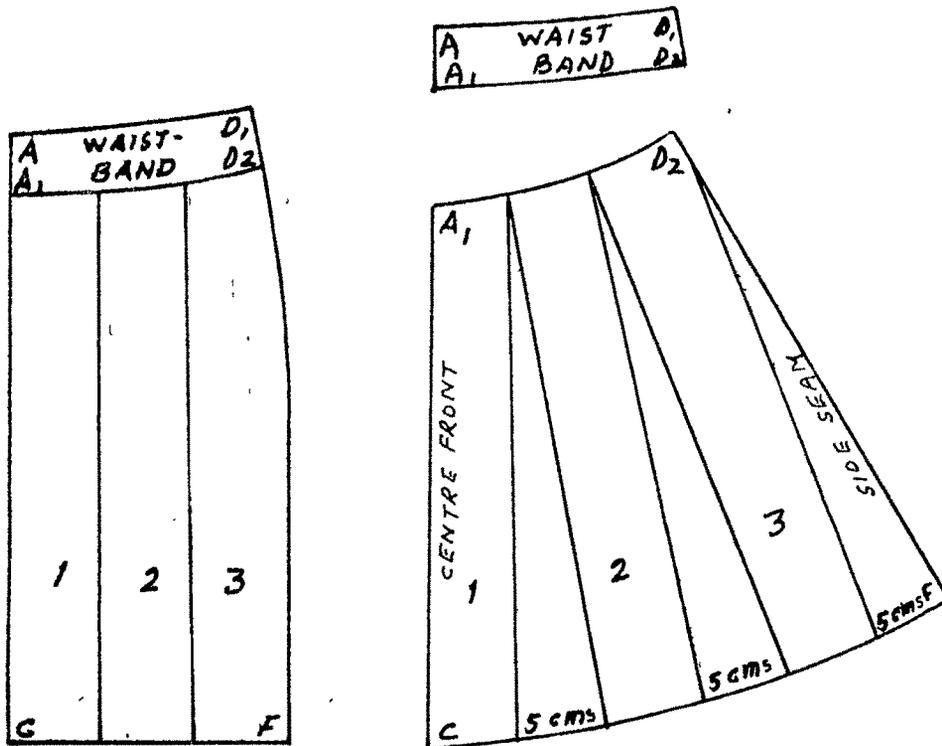
## DIAGRAM-30

INSTRUCTIONS:-

A_1-D_2 = 3.5 cm FROM $A-D_1$ FOR WAIST BAND.

DIVIDE A_1-D_2 AND C-F INTO 3 EQUAL PARTS.

SLASH VERTICALLY AND SPREAD APART ADDING

15 CMS AT C-F AS SHOWN. CONNECT D_2-F.

Skirt A:

    An elastic waisted skirt without the use of any fastener
(Figure 27).

Skirt B:

    With centre front opening fastened with a zipper. At the
waist a metal hook and bar were stitched (Figure 28).

Skirt C:

    Centre front opening fastened with a zipper. At the waist
2.5 cms long Velcro dabs placed under buttons (Figure 29).

Skirt D:

    Centre front skirt opening overlap was closed with 3 cms
Velcro dabs and Velcro dabs were used at the waist band
(Figure 30).

    A skirt with elastic at the waist was easy to put on and
take off for her with one hand. Elastic prevented skirt from
falling down completely everytime when she pulled with one hand
to wear it.

    Since she had sufficient power in the right hand, she held
the right side of the skirt between the elbow and body to keep
skirt in place while manipulating the fasteners which were
located in the centre front of the skirts.

SKIRTS
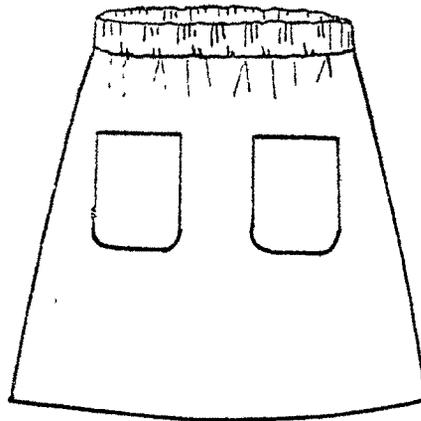
FIGURE - 27

A SKIRT WITH ELASTIC BAND
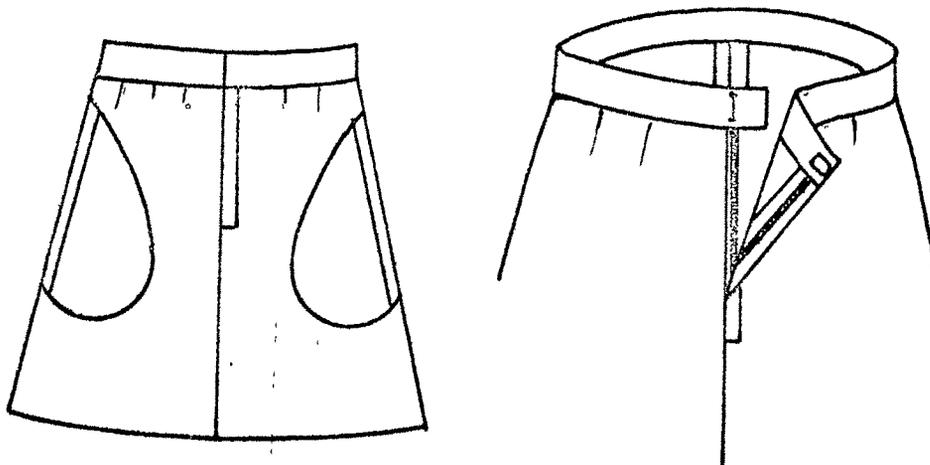
FIGURE - 28

CENTRE FRONT OPEN SKIRT FASTEN
WITH A ZIPPER AND METAL HOOK-BAR
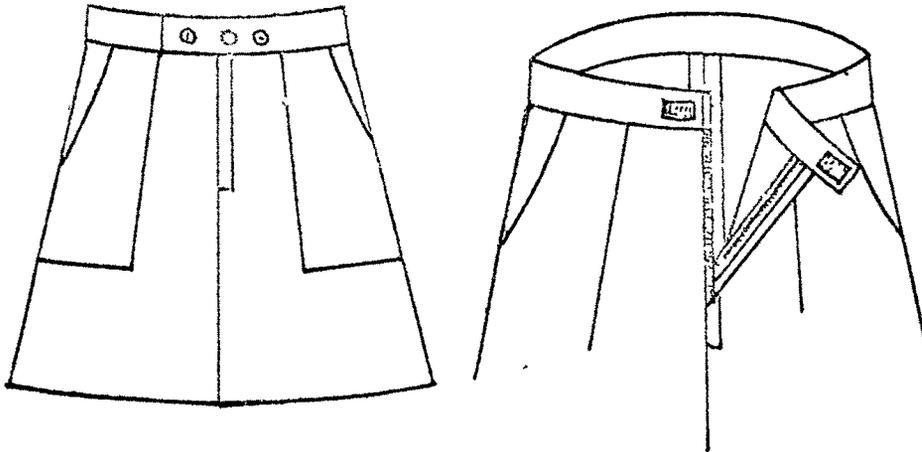
FIGURE - 29

CENTRE FRONT OPEN SKIRT CLOSE WITH
ZIPPER AND VELCRO FASTENER
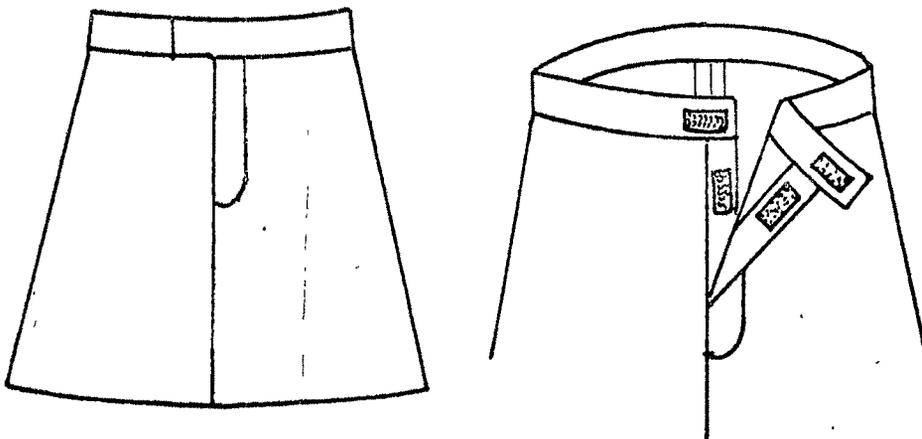
FIGURE - 30

CENTRE FRONT OPEN SKIRT WITH VELCRO
FASTENER

Evaluation of Designed Garments

Table 8

Mean scores on upper and lower garments for Subject C

Garment	Ease of wearing	Manipula-tion of fasteners	Fit of the garment	Appropriate-ness of the pattern for the disability	Appearance of the child when the garment is put on	Its comfort	Ease of removing
				Mean Scores (Range 1-5)			
Upper garment							
Blouses -							
front full open with Velcro as fastener	4.5	4.8	4.8	4.6	4.8	4.8	5.0
front full open with press buttons	4.6	5.0	4.6	4.6	4.8	5.0	4.8
A dress with big button and buttonhole	4.8	4.8	4.8	4.8	4.8	4.6	4.8
Lower garment							
Skirts -							
an elastic waisted skirt	4.6	4.8	4.6	4.8	5.0	4.8	4.8
with zipper and hook-bar	4.6	4.5	4.8	4.8	4.8	5.0	4.6
with zipper and Velcro dabs	5.0	4.6	5.0	4.8	5.0	4.8	4.6
with Velcro dabs only	5.0	4.8	5.0	4.8	5.0	4.8	5.0

Table 8 shows the ratings on upper and lower garments for Subject C. The mean score for manipulating press buttons was 5; for big buttons, Velcro and elastic was 4.8 which was somewhat greater than that for zipper and hook-bar. These results indicated that fasteners like zipper and hook-bar which require two hand co-ordination were little difficult to be managed by the subject.

Case Study 4

<u>Subject D</u>:

A nine year old boy who was quadriplegic. His four extremities were affected by spastic paralysis at the age of two. He lived with his parents. He attended Crippled Home day school irregularly as he was partially dependent on others for his self-care due to many physical problems. These were:

1. Spasticity in the muscles.

2. Weak arms and hands.

3. Poor co-ordination of fingers.

4. Poor grasping power in hands.

5. Slow in his approach.

6. Poor balance.

He normally wore stretch shorts, T-shirts and shirts. Sometimes he wore long pants (Plate 12). His mother reported that she purchased them ready-made and dressed the subject herself.

The investigator observed that the stretch shorts which he wore were small for his size. His mother reported that she bought them as free size from the local market two years ago and there was no bigger size available to replace them. She continued to make him wear these because it had no fasteners and easy for her to dress him since it was stretchable.

PLATE – 12

SUBJET – D DRESSED
IN CLOTHES AT SCHOOL.

But it was difficult for him to manage toiletting immediately
and independently in it as he could not pull it down nor do
through the shorts' leg as it was too tight for him.

Since the subject was dressed by his mother due to the
physical problems still the investigator tried to study his
exact difficulties while dressing himself. However, it was found
that his main dressing problems were:

1. To get into the garment to wear.
2. Unable to do fastening.

To help the subject to become independent in his dressing,
first the button belt was tried on him to see his difficulties
and ability in manipulating the different fasteners. It was
found that due to the spasticity in the muscles and poor
co-ordination of fingers he could not even manage a big button
and buttonhole. The only fastener that he could somewhat manipulate
was Velcro.

After considering his ability in fastening and his physical
limitations a pair of shorts (Diagram 31) was drafted.

<u>Drafting instructions for Shorts</u>:　(Subject D)

    <u>Measurements</u>

1. Shorts' length   =   30 cms
2. Crotch length   =   18 cms

DRAFT OF SHORTS (SUBJECT-D)

## SCALE=$1/4$
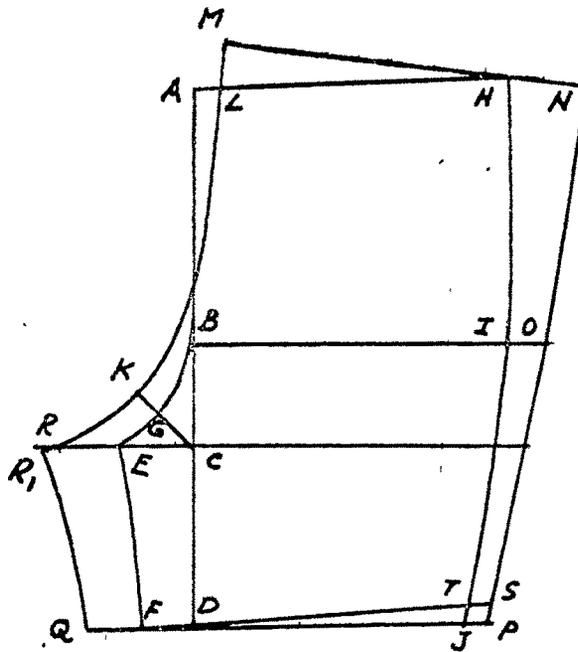
DIAGRAM - 31

3. Waist girth   = 60 cms

4. Hip girth   = 64 cms

5. Round leg   = 36 cms.

Front: (Diagram 31)

A - D = Shorts' length = 30 cms

A - C = Waist to crotch plus 2 cms = 18 + 2 = 20 cms

C - B = One-twelfth of the hip girth = 5.3 cms

C - E = One-sixteenth of the hip girth = 4 cms

C - G = Half measurements from C to E plus 1 cm at 45° =
          2 + 1 = 3 cms

Connect E-G-A as indicated on the diagram.

D - F = One-twelfth of the round leg = 3 cms

Connect E-F as shown on the diagram.

A - H = One-fourth of the waist girth plus 2.5 = 15 + 2.5
          = 17.5 cms

B - I = One-fourth of the hip girth plus 1.5 = 16 + 1.5
          = 17.5 cms

F - J = Half found leg = 18 cms

Connect H-I-J as indicated on the diagram.

J - T = 1 cm.

Back: (Diagram 31)

The draft is made on that of the Front.

E - R = C-E or one-sixteenth of the hip girth = 4 cms

$R - R_1$ = .5 cm

F - Q = D-F or one-twelfth of the round leg = .3 cms

 Connect R_1-Q as indicated on the diagram.

G - K = 1.5 cm

A - L = 1.5 cm

 Connect R_1-K-L with a curve for crotch and continue to M

 which is 2 cms from L.

 Extend A-H line.

M - N = One-fourth of the waist girth plus 5 cms on A-H line
    = 15 + 5 = 20 cms.

I - O = 1.5 to 2 cms

J - P = 1.5 cm

 Connect N-O-P as indicated on the diagram.

P - S = 1 cm

 Connect Q-T-S.

To make him independent in the wearing of the lower garment, the following features were included in the shorts (Figure 31). These were:

Loose fitting

His spastic body needed loose fitting for freedom of actions to get into the garment to wear. Therefore, the shorts was made larger at waist and hip.

Elastic at the waist

Elastic at the waist was used to avoid fastening in the shorts. A loose stretch elastic was used to aid in pulling shorts
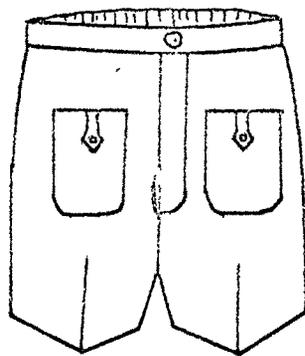
FIGURE - 31

SHORTS WITH ELASTIC AT THE
BACK WAIST BAND AND SIMULATED FLY

PLATE — 13
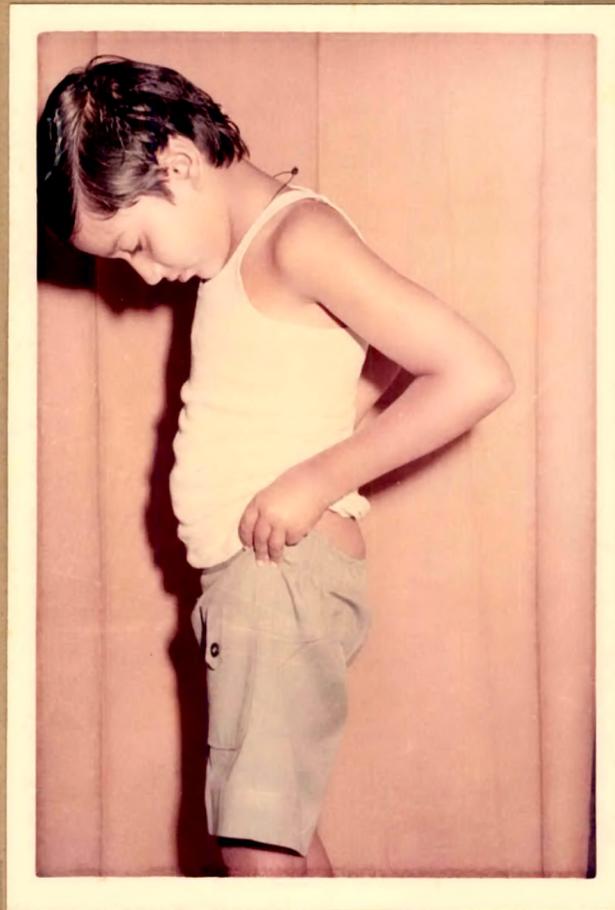
A LOOSE STRETCH ELASTIC AND
A LOOSE FITTING ENABLED SUBJECT
TO BECOME INDEPENDENT IN WEARING
LOWER GARMENT.

up and to slip down with minimum strength, since the subject had weak arms and hands.

Simulated fly

His problem of toiletting was solved by means of a simulated fly in his shorts. With a few trials, he could manipulate it, himself. This feature was invaluable to him since he had difficulty in dressing himself.

The shorts was given to the subject to wear for a month. During this period he attended school more regularly. The reason as explained by his mother was that because of fly in the shorts he could take care of himself in the school, as well as at home.

To wear the shorts, first he slipped into the shorts while seated on the floor. Then he stood and pulled the shorts up (Plate 13). Use of elastic at waist prevented shorts from falling down completely every time when he pulled up since it expanded and contracted with the body movements.

His main difficulties while wearing the upper garments were that:

1. It was difficult for him to bring left sleeve forward from the back to get into it while wearing a shirt with full front open.

2. Unable to get into slip over head style without an aid, because he could not move, bend or stretch his arms freely to get into it.

The above observation indicated that he needed guidance for wearing garment himself. So to make him independent to wear upper garment, a shirt was drafted and constructed (Diagram 32, 33, 34).

Drafting instructions for Shirt: (Subject D)

Measurements

1. Shirt length = 42 cms
2. Round neck = 28 cms
3. Shoulder width = 30 cms
4. Chest girth = 62 cms
5. Waist girth = 60 cms
6. Half sleeve length = 16 cms
7. Round sleeve = 25 cms.

Front: (Diagram 32)

A - B = Shirt length = 42 cms

A - C = One-sixth of the round neck less .5 cm = 4.6 - .5
= 4.1 cms

A - D = One-sixth of the round neck = 4.6 cms

Join C to D with a curve for the front neckline.

C - E = Half shoulder width = 15 cms

A - G = One-fourth of the chest girth less 2 cms = 15.5 - 2
= 13.5 cms

G - F = One-fourth of the chest girth plus 3 cms = 15.5 + 3
= 18.5 cms

DRAFT OF SHIRT (SUBJECT-D)

SCALE = 1/4
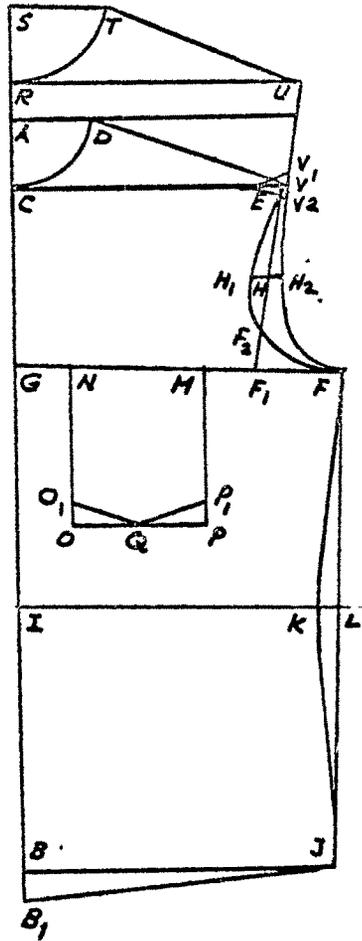
DIAGRAM- 32
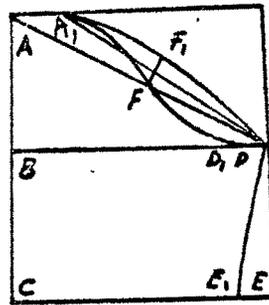
DIAGRAM- 33
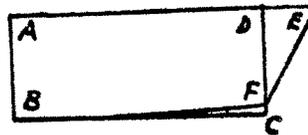
DIAGRAM-34

$G - F_1$ =   C-E less 1.5 cm = 15 - 1.5 = 13.5 cms

Connect E-F_1.

F_1- H =   Half the measurement from F_1 to E = 5 cms

H - H_1 =   1 cm

F_1- F_2 =   1.5 cm

Join E-H_1-F_2-F with curve as in the diagram.

G - I =   A-G = 13.5 cms

B - J =   G-F = 18 cms

J is perpendicular to F.

J - L =   B-I = 15 cms

K - L =   1.5 cm

Connect F-L-J as indicated in the diagram.

B - B_1 =   1.5 cm

Connect B_1-J with a slight curve.

Pocket: (Diagram 32)

F_1- M =   3.5 cms

M - N =   One-eighth of the chest girth = 7.6 cms

N - O =   M-N plus 1 cm = 7.6 + 1 = 8.6 cms

O - Q =   Half the measurement from O to P = 3. 8 cms

O - Q_1 =   1 cm and P-P_1 = 1 cm

Connect O_1-Q-P_1.

Back: (Diagram 32)

A - R = 2 cms

R - S = One-sixth of the round neck less .5 cm = 4.6 - .5
= 4.1 cms

S - T = One-sixth of the round neck plus 1 cm = 4.6 + 1
= 5.6 cms

Join R to T with a curve for the back neckline.

Square out R.

T - U = D-E = 11.4 cms

H_1- H_2 = 1.5 cm

Join U-H_2-F with a curve as shown in the diagram.

Yoke: (Diagram 32)

Extend C line.

V - V_1 and V - V_2 = .5 cm on either side of V

Connect C-V_1 and C-V_2 as indicated on the diagram with a
slight curve.

Half Sleeve: (Diagram 33)

A - C = Sleeve length = 16 cms

A - B = One-eighth of the chest girth = 7.6 cms

B - D = One-fourth of the chest girth less 1 cm = 15.5 - 1
= 14.5 cms

C - E = B-D = 14.5 cms

A - A_1 and D - D_1 = 2.5 cms

Connect A-D and A_1-D.

A - F = Half the measurement from A-D = 8.3 cms

F - F$_1$ = 2 cms perpendicular to A-D

Connect A-A$_1$-F-D$_1$-D and A-A$_1$-F$_1$ and D as illustrated on the diagram.

C - E$_1$ = Half of the round sleeve = 12.5 cms

Connect E$_1$-D.

Collar: (Diagram 34)

A - B = 6 cms

B - C = Half the round neck plus .5 cm = 14 + .5 = 14.5 cms

A - D = B-C = 14.5 cms

D - E = 2.5 cms

C - F = 1 cm

Complete the draft according to the diagram.

The features included were:

Loose fitting and front full open for free movements (Figure 32)

Due to the restricted movements of arms and hands he needed loose fitting to allow greater freedom of movements while wearing garment. Therefore a larger shirt was made. It was kept open in the front for free actions to get in and out easily.

The difficulty of getting into the left sleeve from the back, after putting arm into the right sleeve was solved by teaching the subject to wear the shirt over his head. He sat in a comfortable position on a stool or chair or bed where his legs
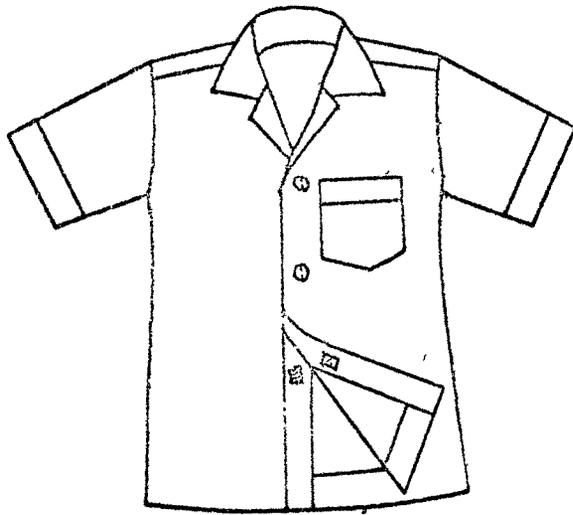
FIGURE - 32

FULL FRONT OPEN SHIRT WITH

MINIMUM NUMBER OF VELCRO

FASTENER

PLATE – 14

SUBJECT–D WEARING SHIRT OVER
THE HEAD.

could rest on the floor. The shirt was placed with the front down on his lap. He passed his arms through the sleeves and pushed the sleeves up to the elbows. It was important for the sleeves to be pulled above the elbows. After that, he held the shirt and pulled it over his head and shoulder (Plate 14). The loose fitting of the shirt and full opening aided to wear it with ease.

Use of Velcro as fastener

Velcro, the simple type of fastening which he could manipulate was the only possible solution to make him independent in closing the shirt. Two sections of 1.5 cm long Velcro dabs were stitched on the front overlappings (Figure 32). The top fastening was placed low enough for him to be visible while fastening.

These were patted (Plate 15) by the subject into place, since the two sections of the fastener (Velcro) require light pressure and minimum skill of manipulation to make it touch each other to stay closed as well as to peel apart to open. Buttons were sewn on top of the Velcro dabs to indicate the position of the fastener and to give a regular appearance to the shirt.

The subject had difficulty to join them evenly. This was improved by making him stand in front of a mirror and the investigator behind to give him practice to match the top fastening accurately and evenly and then to line up others.

PLATE — 15

VELCRO FASTENERS PATTED
INTO PLACE TO CLOSE.

With patience and a tremendous co-operation from the subject the investigator was able to make him independent in his dressing.

Evaluation of Designed Garments

Table 9

Mean scores on lower and upper garments for Subject D

Garment	Ease of wearing	Manipulation of fasteners	Fit of the garment	Appropriateness of the pattern for the disability	Appearance of the pattern child when the garment is put on	Its comfort	Ease of removing
				Mean Scores (Range 1-5)			
Lower garment							
Shorts with elastic at waist	4.3	3.8	4.5	4.6	4.8	4.5	4.5
Upper garment							
Shirt having Velcro as fastener	4.3	4.6	4.6	4.6	4.8	4.6	4.8

The mean score for manipulation of fastener was 3.8 and
for ease of wearing 4.3 which were lowest for shorts than other
features. Pulling up the shorts demands strength as well as
mobility. His physical problems like spasticity in muscles,
weak arms and poor grasping power in hands were such that even
simple elastic at waist was insufficient to enable him to wear
shorts properly well which must have affected his ability to
dress in a short time.

Case Study 5

<u>Subject E</u>:

A nine year old an orphan boy lived in the Crippled Home, Baroda. His life history was not available. The Crippled Home authorities could only say that he was sent there by the State Home for Women, Surat.

He had T.B. of the spine (Kyphosis) (Plate 16). His deformities were:

1. Huge hunchback.
2. Short neck.
3. Protruding chest.
4. Small waistline.

His upper and lower extremities were normal and he moved around freely without the use of any assistive aid. He normally wore shirt that was big for him. He was independent in his self-care.

Although he was independent in his dressing, his hunch at the back created some problems while wearing his upper as well as lower garments.

The problems for upper garments were:
1. Noticeable arch of the hunch at the back.

170

PLATE – 16

SUBJECT–E WITH HUNCHBACK

2. The centre back of the garment pulled up at the hem emphasising the deformity.

3. Wear and tear on back areas of clothing due to strain of the hunch.

The investigator tried to overcome the above problems by:

Altering the basic block to improve the fitting. Therefore a shirt was drafted (Diagram 35, 36, 37) as per instructions given below:

Drafting instructions for Shirt: (Subject E)

Measurements

1. Shirt length   = 39 cms
2. Round neck   = 30 cms
3. Shoulder width   = 32 cms
4. Chest girth   = 70 cms
5. Waist girth   = 58 cms
6. Half sleeve length= 18 cms
7. Round sleeve   = 26 cms.

Front: (Diagram 35)

A - B = Shirt length = 39 cms

A - C = One-sixth of the round neck less .5 cm = 5 - .5
          = 4.5 cms

A - D = One-sixth of the round neck = 5 cms

DRAFT OF SHIRT (SUBJECT-E)

SCALE = 1/4
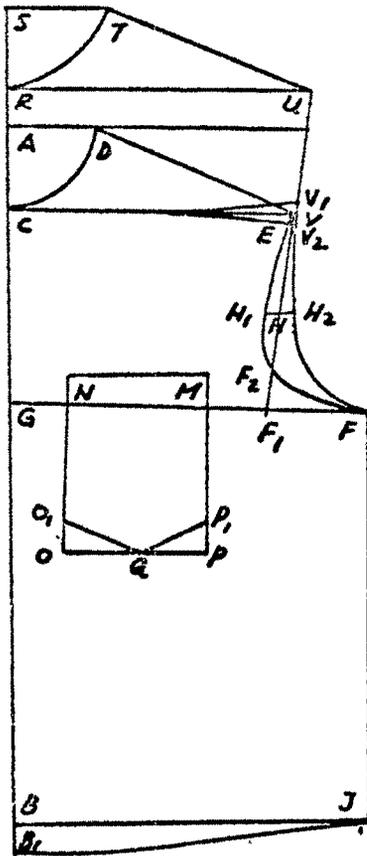
DIAGRAM - 35
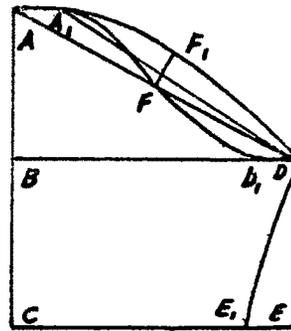
DIAGRAM - 36

DIAGRAM - 37

Join C to D with a curve for the front neckline.

C - E = Shoulder width = 16 cms

A - G = One-fourth of the chest girth less 2 cms = 17.5 - 2
= 15.5 cms

G - F = One-fourth of the chest girth plus 2.5 = 17.5 + 2.5
= 20 cms

G - F_1 = C-E less 1.5 cm = 16 - 1.5 = 14.5 cms

Connect E-F_1.

F_1- H = Half the measurement from F_1 to E = 5.5 cms

H - H_1 = 1 cm

F_1- F_2 = 1.5 cm

Join E-H_1-F_2-F with curve as in the diagram.

B - J = G-F = 20 cms

J is perpendicular to F.

Connect F-L-J as indicated in the diagram.

B - B_1 = 1.5 cm

Connect B_1-J with a slight curve.

Pocket: (Diagram 35)

F_2- M = 3 cms

M - N = One-eighth of the chest girth less 1 = 8.6 - 1
= 7.6 cms

N - O = M-N plus 2 cms = 7.6 + 2 = 9.8 cms

O - Q = Half the measurement from O to P = 3.8 cms

O - Q_1 = 1 cm and P-P_1= 1 cm

Connect O_1-Q-P_1.

<u>Back</u>: (Diagram 35)

A - R = 2 cms

R - S = One-sixth of the round neck less .5 cm = 5 - .5
= 4.5 cms

S - T = One-sixth of the round neck plus 1 cm = 5 + 1 = 6 cms

    Join R to T with a curve for the back neckline.

    Square out R.

T - U = D-E = 12 cms

H_1- H_2 = 1.5 cm

    Join U-H_2-F with a curve as shown in the diagram.

<u>Yoke</u>: (Diagram 35)

    Extend C line.

V - V_1 and V - V_2 = .5 cm on either side of V

    Connect C-V_1 and C-V_2 as indicated on the diagram with a

    slight curve.

<u>Half Sleeve</u>: (Diagram 36)

A - C = Sleeve length = 18 cms

A - B = One-eighth of the chest girth = 8.8 cms

B - D = One-fourth of the chest girth less 1 cm = 17.5 - 1
= 16.5 cms

C - E = B-D = 16.5 cms

A - A_1 and D - D_1 = 2.5 cms

    Connect A-D and A_1-D.

A - F = Half the measurement from A-D = 9 cms

F - F_1 = 2 cms perpendicular to A-D

    Connect $A-A_1-F-D_1-D$ and $A-A_1-F_1$ and D as illustrated on the diagram.

C - E_1 = Half of the round sleeve = 13 cms

    Connect E_1-D.

<u>Collar</u>: (Diagram 37)

A - B = 6 cms

B - C = Half the round neck plus .5 cm = 15 + .5 = 15.5 cms

A - D = B-C = 15.5 cms

D - E = 2.5 cms

C - F = 1 cm

    Complete the draft according to the diagram.

<u>Altering the basic block to improve the fitting</u>

    The subject's short neck and the arch of the hunch at the centre back caused the neck of the garment to pull up at the back. The fitting of the neckline was improved by raising 1 cm in the front (Diagram 38) and back neck was deepened by 1 cm (Diagram 39).

    The yoke pulled up at the back across the shoulder line and made unnecessary folds. The fitting of the yoke line at this point was improved by reducing the yoke width by 1.5 cm (Diagram 40).

# NECK AND YOKE ALTERATIONS

SCALE = 1/4

YOKE

DIAGRAM - 39

FRONT
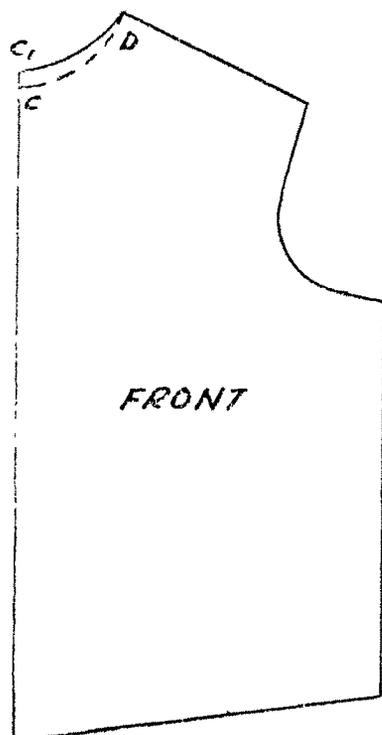
DIAGRAM - 38

BACK

DIAGRAM - 40

INSTRUCTIONS:-

C_1 FROM C = 1 cm (FRONT NECK)

R_1 FROM R = 1 cm (BACK NECK)

INSTRUCTIONS:-

$X - X_1$ = 1.5 cm FROM $C - V_1$

$X_2 - X_3$ = 1.5 cm FROM $C - V_2$

In order to accommodate the curvature and to reduce the
friction from the hunch, 6 cms was added at the centre back
(Diagram 41) for fullness. The fullness was distributed more at
the centre than on the sides since the hunch was more prominent
in the centre so also the wear.

Due to the protruding hunch, the centre back of the shirt
pulled up at the hem which emphasised the deformity. This was
improved by raising centre of the back block 3 cms up as shown
in the Diagram 42 to make it hang correctly at the back hem line.

Choosing suitable style of garment and pattern on the material to
disguise the deformity

A loose fitting was preferred to hide the deformity.
Therefore, a straight shirt with front plain to give a slimming
effect and fullness at the back (Figure 33) to accommodate the
curvature of hunch was chosen as a suitable style for him.

A collar with a stand and stiff lining in it which normally
worn by him was avoided. Instead an open rolled collar to give
V-neck in the front with soft lining in it was preferred by the
investigator to give him a better appearance at the neckline.

Two materials with different patterns suitable for shirts
were chosen to see which would minimize the appearance of
deformity. One was with woven plaid in blue, black and white

BACK ALTERATIONS

SCALE = $1/4$

BACK
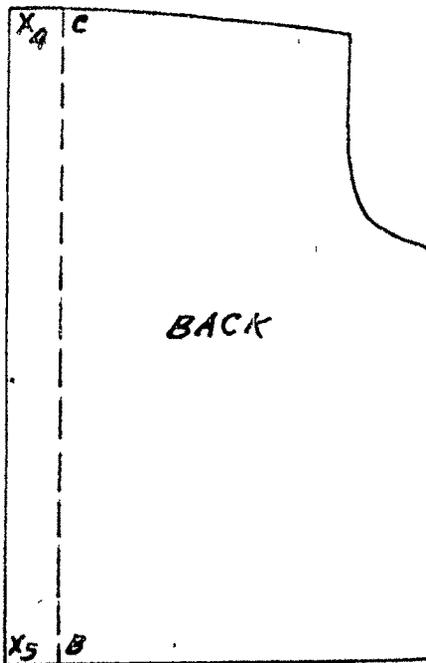
BACK

DIAGRAM-41

DIAGRAM-42

INSTRUCTIONS:-

$X_4 - X_5 = 3$ CMS FROM C-B

INSTRUCTIONS:-

X_6 FROM $X_4 = 3$ CMS

FINAL PATTERN
SCALE = 1/4
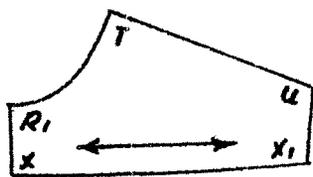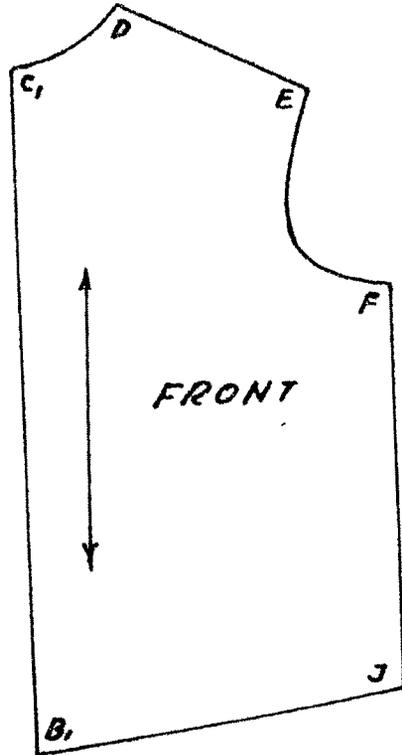
FRONT

YOKE
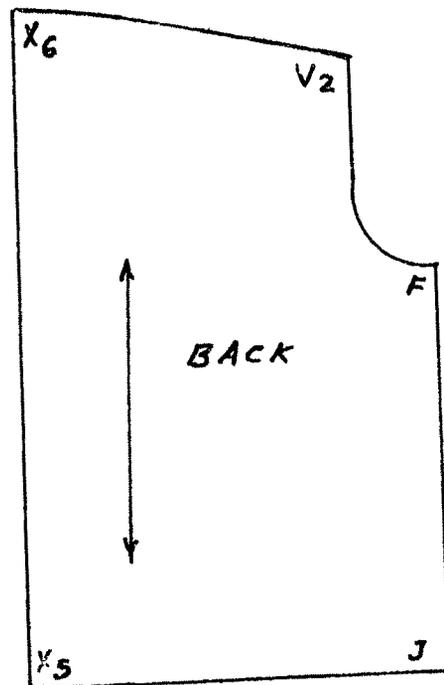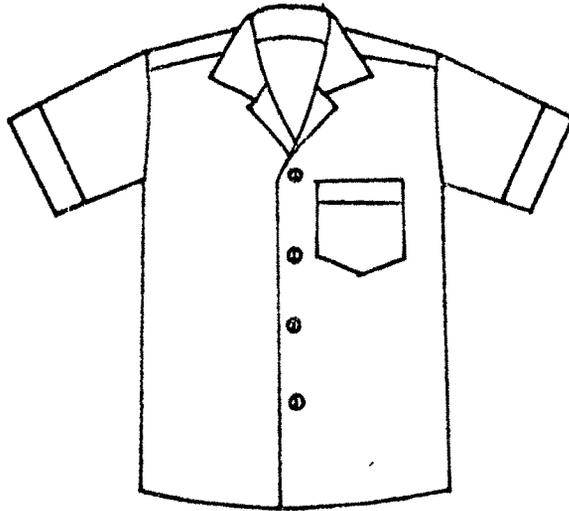
BACK

FRONT VIEW
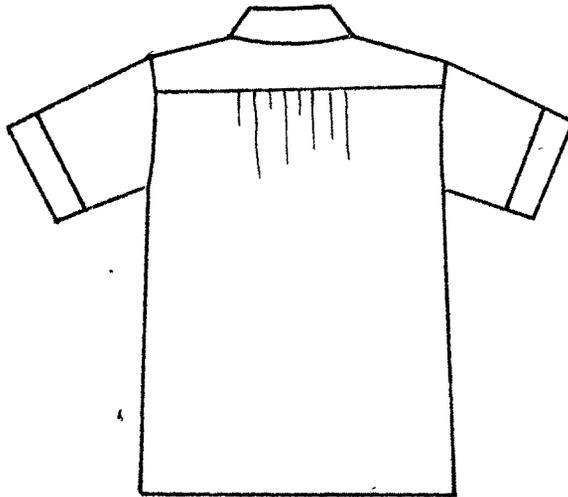
FIGURE -33   BACK VIEW

SHIRT WITH FRONT PLAIN AND FULLNESS AT THE CENTRE
BACK

color (Plate 17) and other had small printed geometrical design
all over in brown color on a white background (Plate 18). Two
shirts were constructed from these materials.

Placing the extra layer of material to reinforce the area of maximum wear

To resist wear on the shirt from the hunch, an extra layer
of the same material 20 cms wide was inserted on the inner side
of the centre back (Diagram 43) of the shirt as shown in Plate 19.
This was done to protect the back of the shirt from the friction
of the hunch and to increase the life of the garment. The
reinforcement can be replaced whenever it is worn out. To replace,
it would only require to rip open yoke seam and hem line to insert
the material without any other alteration in the shirt.

The basic problem in the lower garment was:

The subject had protruding abdomen, small waist and hip line
(Plate 16), therefore it was difficult for him to keep the shorts
with waist band firmly at the waist from slipping down. He pulled
the shorts up every now and then to keep in its place. It was
observed that the subject stood on one leg, the other leg leaning
on the next leg knee to avoid the slipping of the shorts at the
waist.

To help the subject to overcome the above problem a pair of
shorts was drafted (Diagram 44).

PLATE–17

SHIRT MADE OF WOVEN
PLAID MATERIAL.

PLATE–18

SHIRT MADE OF MATERIAL
WITH SMALL ALL OVER
GEOMETRICAL PRINTED DESIGN.

REINFORCEMENT AT THE BACK TO PROTECT
## SHIRT FROM WEAR

SCALE = $\frac{1}{4}$

X_6 X_7

X_5 X_8

BACK

ON FOLD
EXTRA LAYER
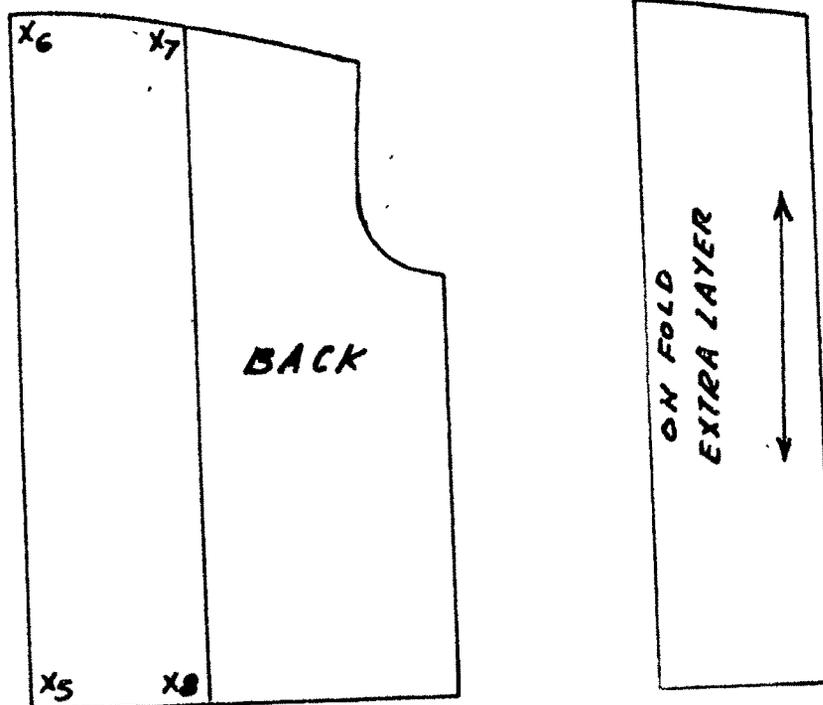
DIAGRAM - 43

<u>INSTRUCTION:-</u>

$X_7 - X_8 = 10$ CMS FROM $X_6 - X_5$

PLATE-19

PLACING THE EXTRA LAYER OF MATERIAL TO
REINFORCE THE AREA OF MAXIMUM WEAR.

<u>Drafting instructions of Shorts</u>:   (Subject E)

    <u>Measurements</u>

  1.   Shorts' length   = 26 cms

  2.   Crotch length   = 16 cms

  3.   Waist girth   = 62 cms

  4.   Hip girth   = 60 cms

  5.   Round leg   = 33 cms.

<u>Front</u>:   (Diagram 44)

A - D = Shorts' length = 26 cms

A - C = Waist to crotch plus 2 cms = 16 + 2 = 18 cms

C - B = One-twelfth of the hip girth = 5 cms

C - E = One-sixteenth of the hip girth = 3.7 cms

C - G = Half measurement from C to E.plus 1 cm at 45° = 1.8 + 1
          = 2.8 cms

    Connect E-G-A as indicated on the diagram.

D - F = One-twelfth of the round leg = 2.8 cms

    Connect E-F as shown on the diagram.

A - H = One-fourth of the waist girth 15.5 cms

B - I = One-fourth of the hip girth plus .5 = 15 + .5 = 15.5 cms

F - J = Half round leg = 16.5 cms

    Connect H-I-J as indicated on the diagram.

J - T = 1 cm.

DRAFT OF SHORTS (SUBJECT-E)
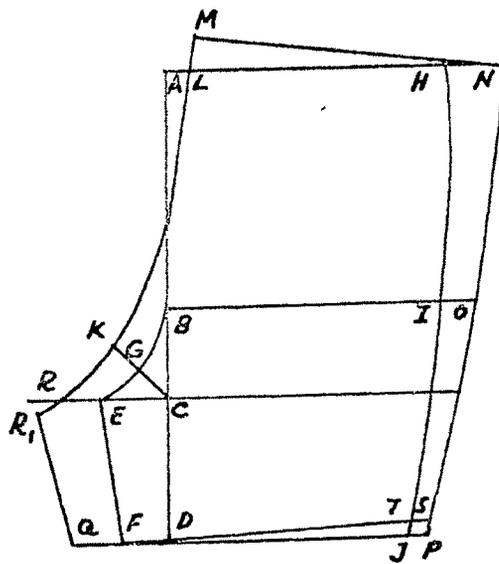
DIAGRAM - 44

<u>Back</u>: (Diagram 44)

The draft is made on that of the Front.

E - R = C-E or one-sixteenth of the hip girth = 3.7 cms

R - R$_1$ = .5 cm

F - Q = D-F or one-twelfth of the round leg = 2.8 cms

Connect R$_1$-Q as indicated on the diagram.

G - K = 1.5 cm

A - L = 1.5 cm

Connect R$_1$-K-L with a curve for crotch and continue to M
which is 2 cms from L.

Extend A-H line.

M - N = One-fourth of the waist girth plus 2 cms on A-H line
= 15.5 + 2 = 17.5 cms

I - 0 = 1.5 to 2 cms

J - P = 1.5 cm

Connect N-0-P as indicated on the diagram.

P - S = 1 cm

Connect Q-T-S.

Two shorts with the following alterations were constructed:

<u>Shorts A</u>:

(a) Elastic around the waist (Figure 34).

<u>Shorts B</u>:

(a) Fly with zipper.

(b) Elastic used in the back of the waist (Figure 35).
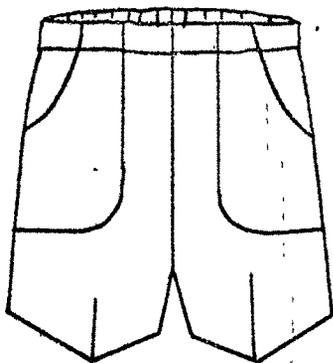
FIGURE - 34

ELASTIC AROUND THE
WAIST
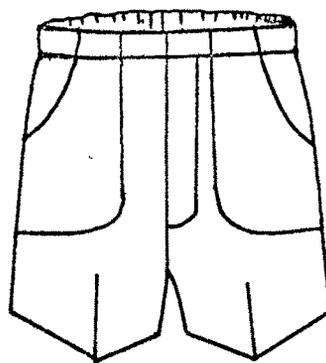
FIGURE - 35

FLY WITH ZIPPER AND
ELASTIC AT THE BACK WAIST

During the one month wear test, it was observed by the investigator that both the shorts fitted snugly around the waist. Elastic at waist gave good support and prevented it from slipping down. It also kept shorts in position at waist even while the subject stood or played etc. The subject was now free from pulling shorts up every now and then nor had to stand in an awkward position to keep it at waist.

Evaluation of Designed Garments

Table 10

Mean scores on upper and lower garments for Subject E

Garment	Fit of the garment	Appropriateness of the style and the pattern on the fabric for the deformity	Appearance of the child when garment is put on	Its comfort
Upper garment				
Shirts -				
with woven plaid material	4.8	4.6	4.8	4.8
small all over geometrical printed design	4.5	4.6	4.8	4.8
Lower garment				
Shorts -				
elastic around the waist	4.8	4.6	4.8	4.8
fly with zipper and elastic only at the back	4.8	4.8	4.8	4.8

The mean score on appearance of the child when the garment is put on was 4.8, and appropriateness of the style and the pattern on the fabric was 4.6 in case of both the shirts which was equal to the rating "very good" (Table 10). From these results it may be concluded that the pattern on the material and loose fitting certainly helped the subject to camouflage the body deformity and gave him a better appearance.

The investigator noticed that the shirt with small all over geometrical design made the adaptations and appearance of deformity less noticeable than the shirt with large plaid pattern (Plate 17).

Case Study 6

<u>Subject F:</u>

A twelve year old boy was disabled by polio-paralysis in both the legs. He came from Padra to Baroda. He attended school for Crippled Home and lived in the hostel. He used braces and underarm crutches to become mobile. Although he was independent in his self-care, his body deformities and the use of appliances presented several problems in his lower as well as upper garments.

The problems in lower garments were:

1. Difficulty in putting on and taking off the trousers.
2. Excessive damage on trousers caused by the use of leg braces specially around the knee.

To solve the subject's above problems a pair of trousers was drafted (Diagram 45, 46) and constructed.

<u>Drafting instructions for Shorts:</u> (Subject F)

   <u>Measurements</u>

   1. Shorts' length   = 34 cms
   2. Crotch length   = 20 cms
   3. Waist girth   = 60 cms
   4. Hip girth   = 64 cms
   5. Round leg   = 40 cms.

DRAFT OF SHORTS (SUBJECT-F)

SCALE = 1/4
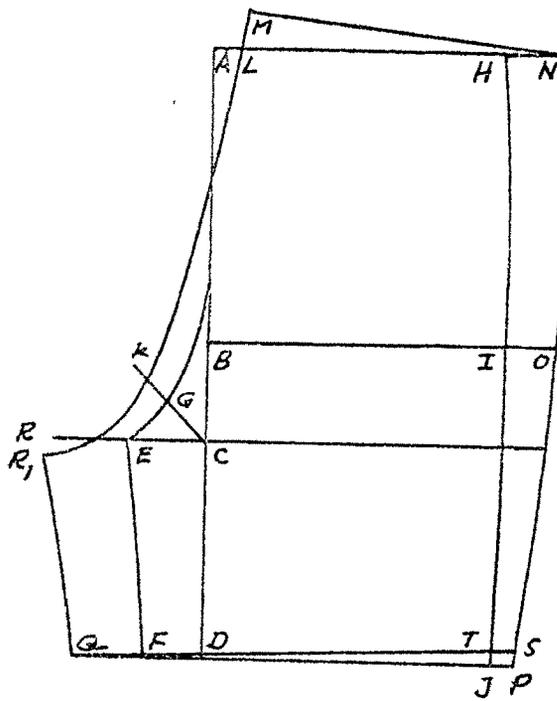
DIAGRAM-45

Front: (Diagram 45)

A – D = Shorts' length = 34 cms

A – C = Waist to crotch plus 2 cms = 20 + 2 = 22 cms

C – B = One-twelfth of the hip girth = 5.3 cms

C – E = One-sixteenth of the hip girth = 4 cms

C – G = Half measurement from C to E plus 1 cm at 45°
           = 2 + 1 = 3 cms

    Connect E-G-A as indicated on the diagram.

D – F = One-twelfth of the round leg = 3.3 cms

    Connect E-F as shown on the diagram.

A – H = One-fourth of the waist girth plus 15 + 1 = 16 cms

B – I = One-fourth of the hip girth plus 1 cm = 16 + 1 = 17 cms

F – J = Half round leg = 20 cms

    Connect H-I-J as indicated on the diagram.

J – T = 1 cm.

Back: (Diagram 45)

    The draft is made on that of the Front.

E – R = G-E or one-sixteenth of the hip girth = 4 cms

R – R_1 = .5 cm

F – Q = D-F or one-twelfth of the round leg = 3.3 cms

    Connect R_1-Q as indicated on the diagram.

G – K = 1.5 cm

A – L = 1.5 cm

    Connect R_1-K-L with a curve for crotch, and continue to M
which is 2 cms from L.

Extend A-H line.

M - N   =   One-fourth of the wrist girth plus 3 cms on A-H line
          = 15 + 3 = 18 cms

I - 0   =   2.5 cms

J - P   =   1.5 cm

Connect N-0-P as indicated on the diagram.

P - S   =   1 cm

Connect Q-T-S.

Drafting instructions for Trousers: (Subject F)

Trace the pattern of Front and Back of the Shorts (Diagram 45) and adapt trousers with the following instructions:

Measurements

1.   Trousers' length   =   78 cms
2.   Round leg   =   44 cms.

Front: (Diagram 46)

A - A_1 =   Trousers' length = 78 cms

E_2 =   Half the measurement from E-E_1 = 10.5 cms

Square down from E_2 to U and up for crease line.

U - W   =   Half of E_2-U plus 5 cms = 28 + 5 = 33 cms

U - U_1 and U - U_2 = A quarter round leg = 11 cms

W - W_1 and W - W_2 = A quarter round leg less 1.5 cm = 11 - 1.5
          = 9.5 cms

Give shape E, W_1 and U_1 and E_1, W_2 and U_2 as illustrated on the diagram.

DRAFT OF TROUSERS (SUBJECT-F)
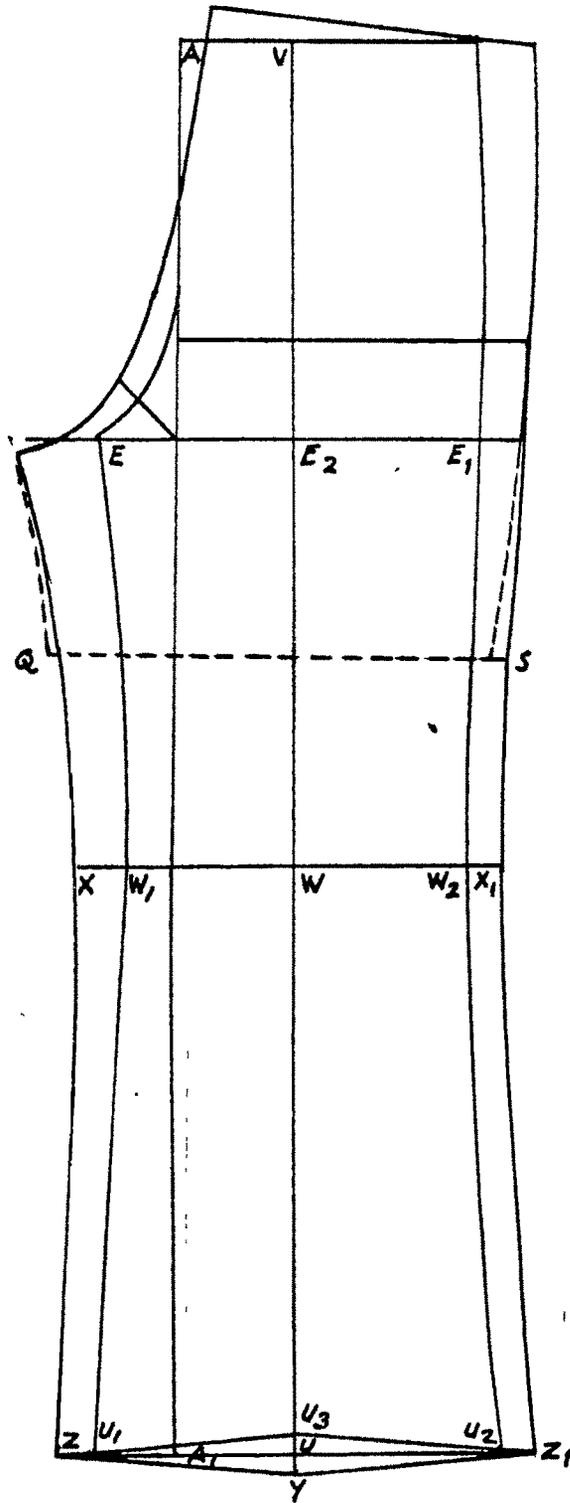
FIGURE - 46

$U - U_3 = 1$ cm

Connect U_1, U_3 and U_2.

Back: (Diagram 46)

$W_1 - X = 2.5$ cms

$W_2 - X_1 = 2$ cms

$U - Y = 1$ cm

$U_1 - Z$ and $U_2 - Z_1 = 2$ cms

Give shape Q, X and Z and S, X_1 and Z_1 as shown on the diagram.

Connect Z, Y and Z_1.

The features included in the trousers (Figure 36) were:

Loose fitting for comfort and to reduce the strain

A loose fitting was desirable for him to ease in permitting the greater freedom of movements, while walking with appliances, to accommodate braces and to reduce the friction on the inside of the trousers due to the braces. Therefore, a pair of straight trousers little wide at hem was constructed to provide loose fitting (Plate 20).

Elastic at waist for free movements

Elastic was inserted in the back waist band to allow free expansion with body movements while walking with appliances and to keep trousers in place snugly.

TROUSERS MADE WITH FEATURES SUCH AS
AN ELASTIC AT THE BACK WAIST, POCKET, FLY
WITH ZIPPER AND AN EXTRA ZIPPER OPENING
PLACED ON SIDE SEAM FOR EASE IN WEARING
AND COMFORT.
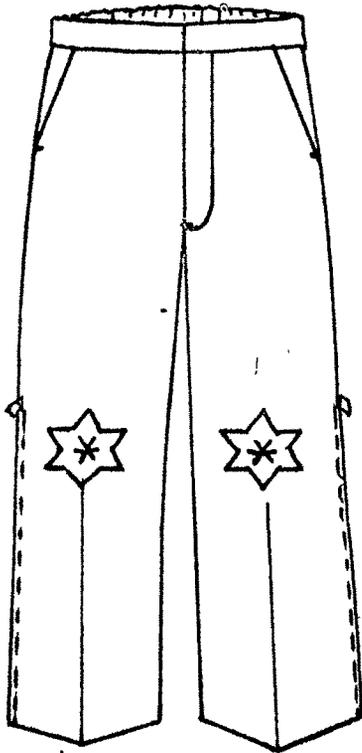
FRONT VIEW

FIGURE - 36
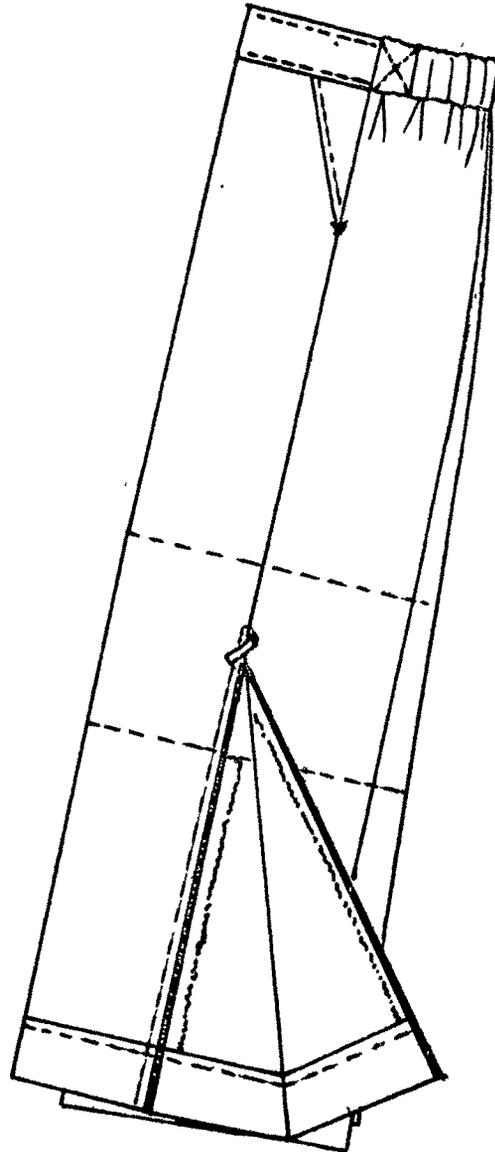
SIDE VIEW

PLATE — 20

SUBJECT-G WEARING DESIGNED
TROUSERS AND SHIRT

Pockets to carry articles

Pockets were made in the front inside of either side seams
to keep the front plain. They were made with adequate provision
to keep small articles of every day use in order to leave both
hands free to hold crutches whilst walking.

Extra opening to facilitate ease in dressing

His main problem was difficulty while wearing trousers over
the braces since they were not flexible and also due to the
restricted body movements when the braces were on. It caused a
great strain and spoiled the neat appearance of the garment while
struggling to wear it over the braces or otherwise crumpled the
trousers' legs if leg braces were worn later.

To overcome the above difficulties an extra opening from the
ankle to above the knee was kept on the outer leg seam of the
trousers. The opening was kept specially on the outer seam to
make it convenient for him to open and close the latch locks of
the braces as they were on the outside. To do this, a matching
colour nylon zipper fastener that could open from the bottom
upwards and could be locked were sewn on these openings.

To make it easy in wearing, the subject wore trousers in a
sitting position on the floor. Then he opened zip fastener and
wore his brace. The latch locks of the brace were closed through
this opening and then the zip was closed and locked at the bottom

to prevent it from opening while walking. The same process was followed while removing the trousers.

This feature in the trousers facilitated greatly in ease of wearing and removing trousers over the braces without causing any strain on the garment or making it crumpled or passing dirty shoes through the trousers' legs.

To reinforce the areas against excessive wear: (Plate 21)

To resist wear from the braces, an extra layer of the same material of the trousers was sewn around the area of maximum wear at the knee as shown in Diagram 47, Figure 37. It was placed in the front and back on the innerside of each leg of trousers (Plate 21). This was done to protect the trousers' legs from friction and hard wear from the knee locks and latches of the braces. The reinforcement can be replaced by ripping two seams whenever worn out.

A machine embroidery was made at each knee in the front of the trousers to make the stitching of the inside layer (reinforcement) look attractive from the right side and to keep both the layers intact.

Two rows of machine stitching at .5 cm distance was done to strengthen the trousers' hem. Inside seams were finished with interlocked stitches to prevent from fraying due to the rubbing of the braces.

FRONT

BACK

W_1

←— KNEE LEVEL —→

16 cms

16 cms

X

X_1

EXTRA LAYER
FOR
THE FRONT

EXTRA LAYER
FOR
THE BACK

DIAGRAM-47

212
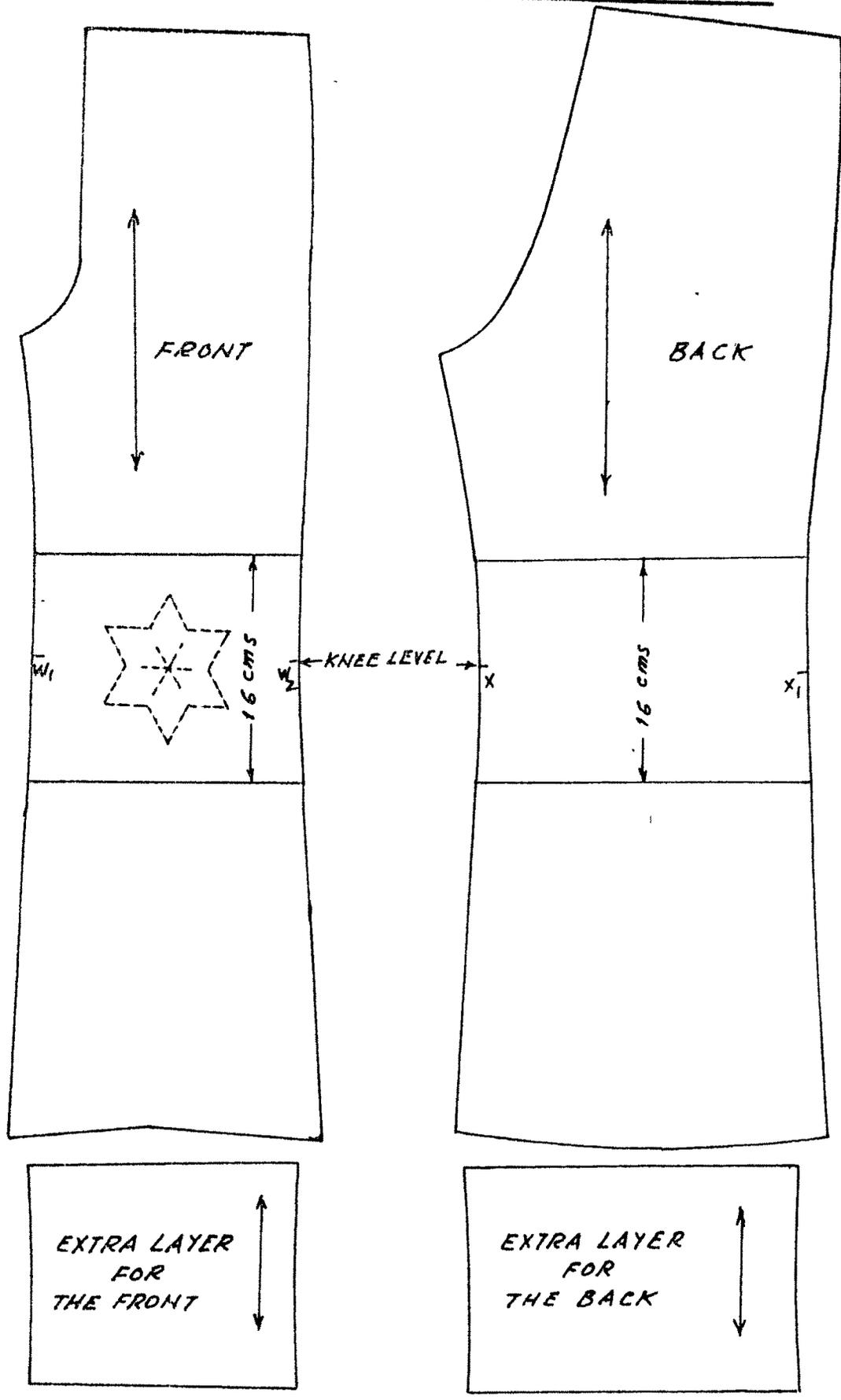
AN EXTRA LAYER OF MATERIAL SEWN AT
KNEE LEVEL AGAINST BRACE WEAR
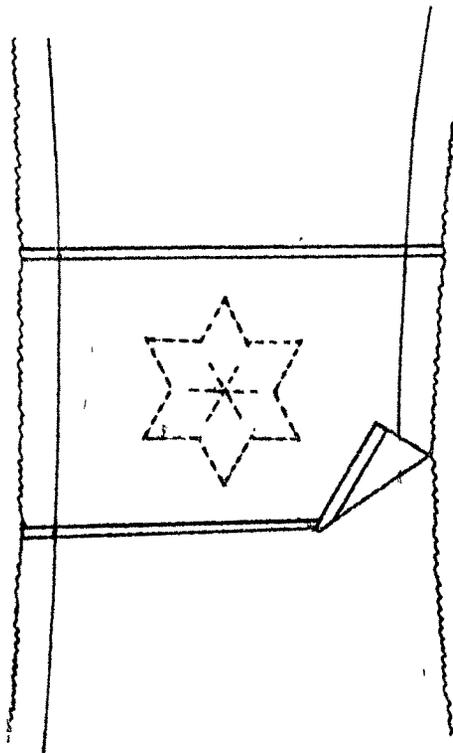
FIGURE - 37

PLATE – 21

WRONGSIDE OF TROUSERS WAS
STRENGTHEN WITH REINFORCEMENT AT
KNEE LEVEL, SEAMS WERE INTERLOCKED
AND TWO ROWS OF MACHINING WAS
DONE AT HIM.

The problem in his upper garments was wear and tear of under arm due to the strain of crutches.

To overcome his above problem, a shirt was drafted (Diagram 59).

Drafting instructions for Shirt: (Subject F)

Measurements

1.	Shirt length	=	55 cms
2.	Round neck	=	30 cms
3.	Shoulder width	=	35 cms
4.	Chest girth	=	72 cms
5.	Waist girth	=	60 cms
6.	Half sleeve length	=	22 cms
7.	Round sleeve	=	30 cms.

Front: (Diagram 48)

A - B = Shirt length = 55 cms

A - C = One-sixth of the round neck less .5 cm = 5 - .5
= 4.5 cms

A - D = One-sixth of the round neck = 5 cms

Join C to D with a curve for the front neckline.

C - E = Half shoulder width = 17.5 cms

A - G = One-fourth of the chest girth less 2 cms = 18 - 2
= 16 cms

DRAFT OF SHIRT (SUBJECT-F)

SCALE = $1/4$
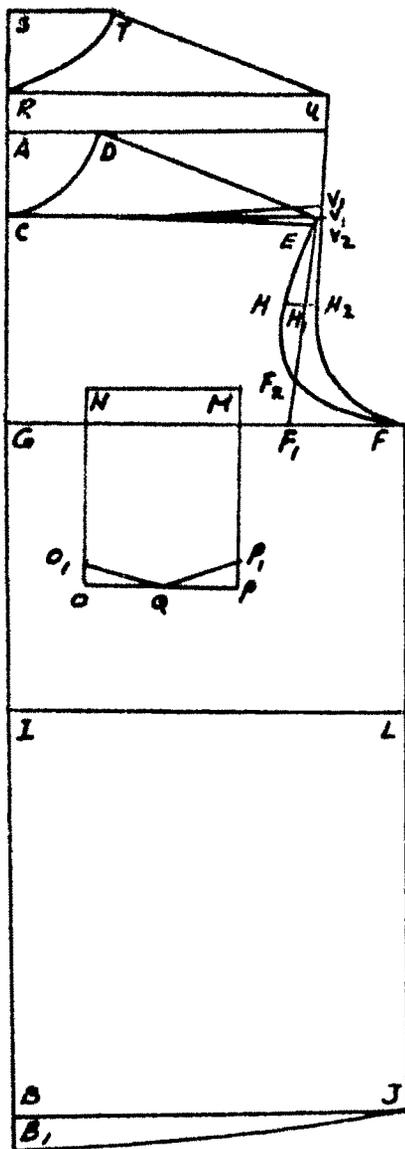
DIAGRAM-48
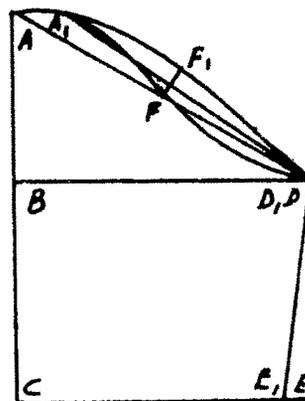
DIAGRAM-49
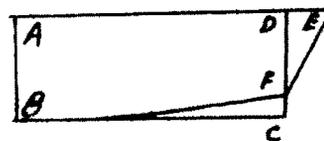
DIAGRAM-50

G - F = One-fourth of the chest girth plus 4 cms = 18 + 4
   = 22 cms

G - F_1 = C-E less 1.5 cm = 17.5 - 1 = 16 cms

   Connect E-F_1.

F_1- H = Half the measurement from F_1 to E = 5.6 cms

H - H_1 = 1 cm

F_1- F_2 = 1.5 cm

   Join E-H_1-F_2-F with curve as in the diagram.

G - I = A-G = 16 cms

B - J = G-F = 22 cms

   J is perpendicular to F.

J - L = B-I = 16 cms

B - B_1 = 1.5 cm

   Connect B_1-J with a slight curve.

Pocket: (Diagram 48)

F_1- M = 4 cms

M - N = One-eighth of the chest girth = 9 cms

N - O = M-N plus 2 cms = 9 + 2 = 11 cms

O - Q = Half the measurement from O to P = 5.5 cms

O - Q_1 = 1 cm and P-P_1 = 1 cm

   Connect O_1-Q-P_1.

Back: (Diagram 48)

A - R = 2 cms

R - S = One-sixth of the round neck less .5 = 4.5 cms

S - T = One-sixth of the round neck plus 1 cm = 5 + 1 = 6 cms

    Join R to T with a curve for the back neckline.

    Square out R.

T - U = D-E = 13 cms

H_1- H_2 = 1.5 cm

    Join U-H_2-F with a curve as shown in the diagram.

Yoke: (Diagram 48)

    Extend C line.

V - V_1 and V - V_2 = 5 cms on either side of V

    Connect C-V_1 and C-V_2 as indicated on the diagram with a slight curve.

Half Sleeve: (Diagram 49)

A - C = Sleeve length = 22 cms

A - B = One-eighth of the chest girth = 9 cms

B - D = One-fourth of the chest girth less 1 cm = 18 - 1
       = 17 cms

C - E = B-D = 17 cms

A - A_1 and D - D_1 = 2.5 cms

    Connect A-D and A_1-D.

A - F = Half the measurement from A-D = 9.5 cms

F - F_1 = 2 cms perpendicular to A-D

    Connect A-A_1-F-D_1-D and A-A_1-F_1 and D as illustrated on the diagram.

$C - E_1$ = Half of the round sleeve = 15 cms

, Connect E_1-D.

Collar: (Diagram 50)

A - B = 6 cms

B - C = Half the round neck plus .5 cm = 15 + .5 = 15.5 cms

A - D = B-C = 15.5 cms

D - E = 2.5 cms

C - F = 1 cm

Complete the draft according to the diagram.

The wear and tear of the shirt was minimized by:

Loose fit for freedom of movements to reduce strain

Loose fitting was desirable for him to allow greater freedom of body movements while walking with the crutches. Therefore, his shirt was made little larger and following features were added for the comfort:

(a) To lessen the strain on the back armholes from shoulder movements while manipulating the crutches, 6 cms fullness (Diagram 51) was added at the centre back to give extra room across the shoulders to ease the movements. This fullness was adjusted at the centre back by means of a box-pleat (Figure 38).

(b) Since the subject used crutches, a collar with a stand which he normally wore was avoided. Instead, an open V-style rolled

BACK ALTERATION

C₁ C
B₁ B
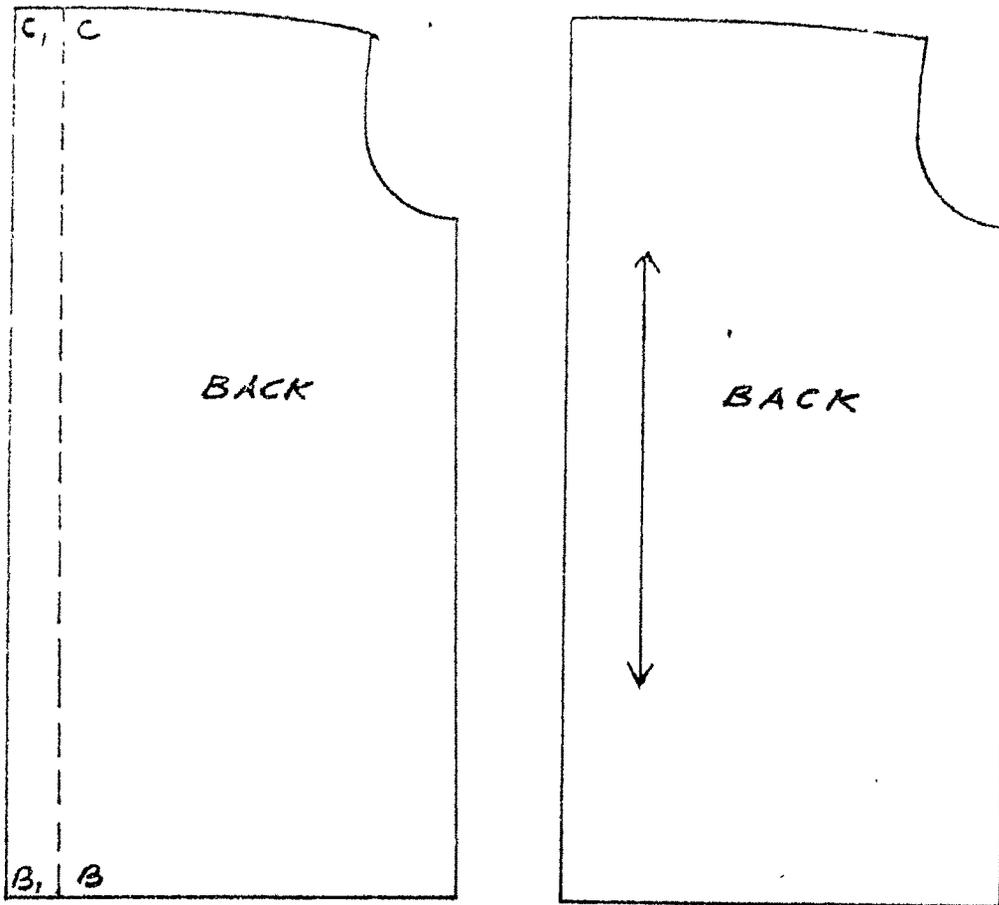
BACK

BACK

FINAL PATTERN

DIAGRAM · 51
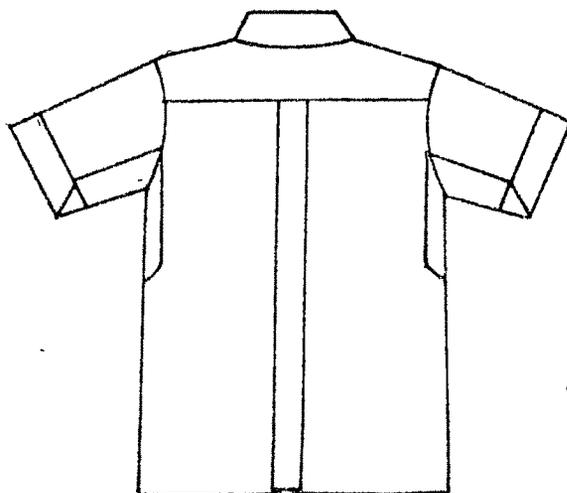
INSTRUCTIONS :-

$C_1 - B_1 = 3\ cms$
FROM C-B

FULLNESS AT THE BACK FOR
EASY SHOULDER MOVEMENTS

FIGURE · 38

collar little low at the back neck was made considering that it would not go up with shoulder movements at the back neck and make him uncomfortable while manipulating the crutches.

(c)   The shirt was kept straight at the bottom and side seam to wear over the trousers for comfort and free movements while walking with appliances.

(d)   The front was full open to facilitate wearing and removing of the shirt with ease while seated.

(e)   The distance of the buttons were placed closer to avoid gaps which otherwise would open due to the strain of the crutches.

(f)   The sleeve length was kept little above the elbow and loose at the round arm for the arms to move freely while using the crutches.

(g)   The pocket was kept little longer in length and higher in position to prevent articles in it from spilling down when bending and walking with the crutches.

To reinforce the areas against excessive wear

To protect the underarm of the shirt from the friction of crutches, a patch of the same material of the shirt as shown in Diagram 52, 53, Figure 39 was placed on the outer side under both the armpits. This type of reinforcement could prolong the life of the shirt by replacing again a layer of the same material

ADAPTATION FOR REINFORCEMENT TO
# PROTECT THE UNDERARMS OF THE SHIRT
AGAINST CRUTCH WEAR

FRONT

5cms

16 CMS

4 cm

BACK

5cms

16 CMS

4 cm

F B

FINAL
PIECE
FOR
SHIRT

DIAGRAM-52

SLEEVE

5cm

14 CMS

3 cm

F B

FINAL
PIECE
FOR
SLEEVE

DIAGRAM-53

222
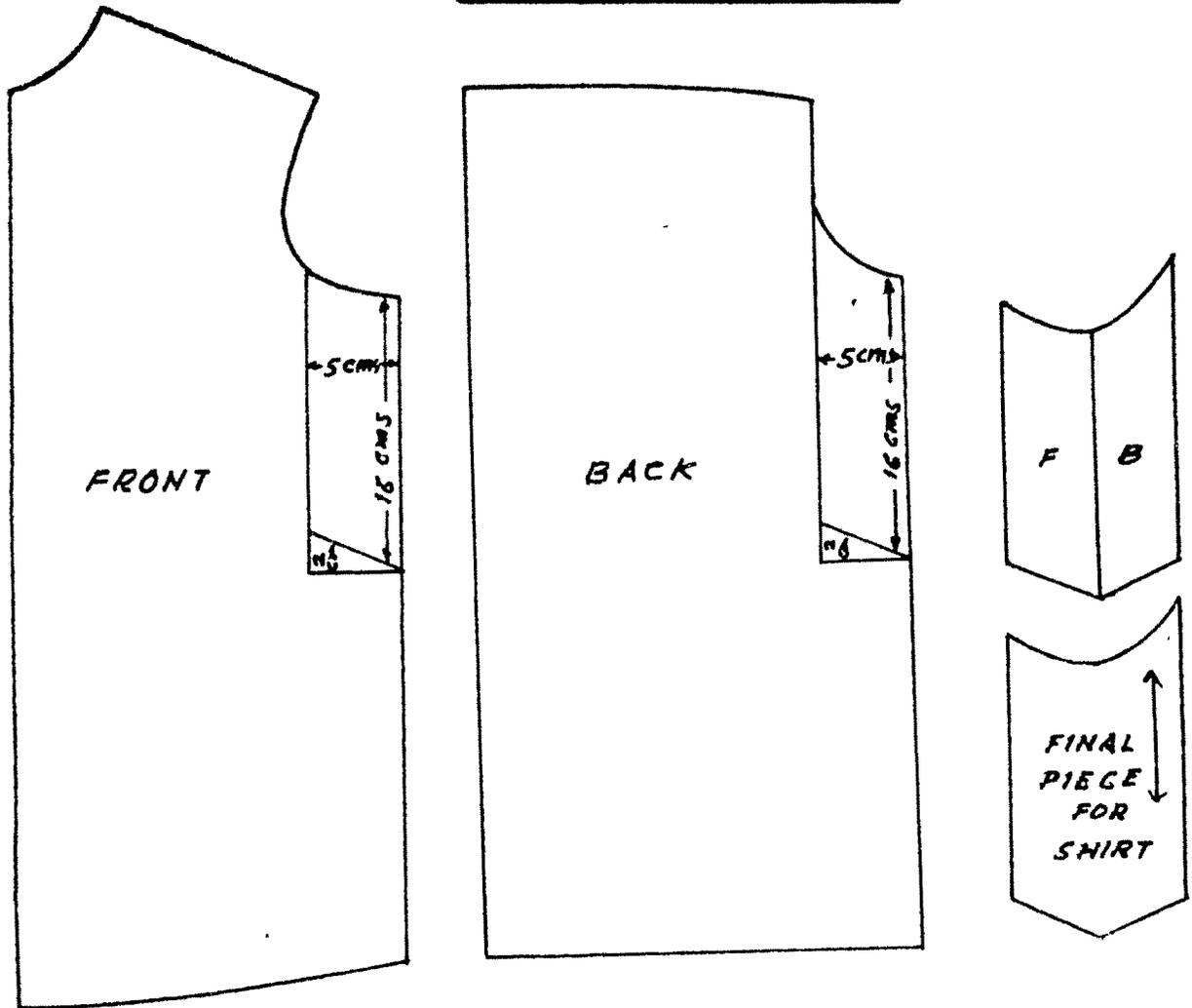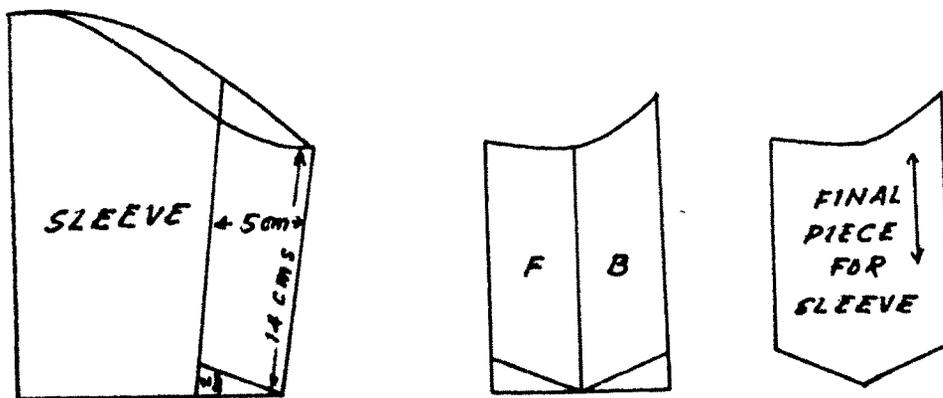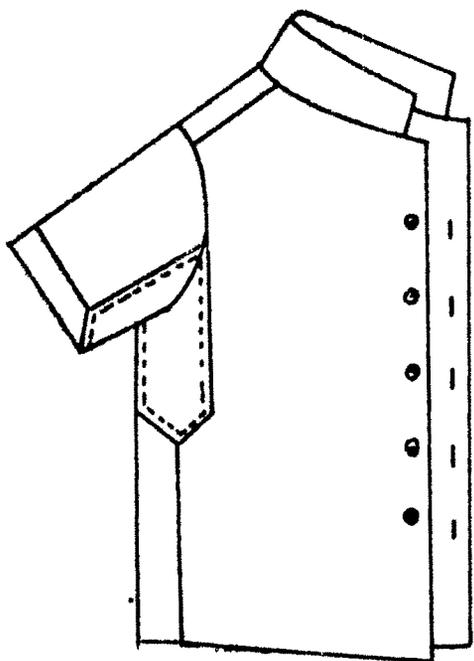
UNDERARM PATCH
TO PROTECT SHIRT
FROM CRUTCH WEAR

FIGURE - 39
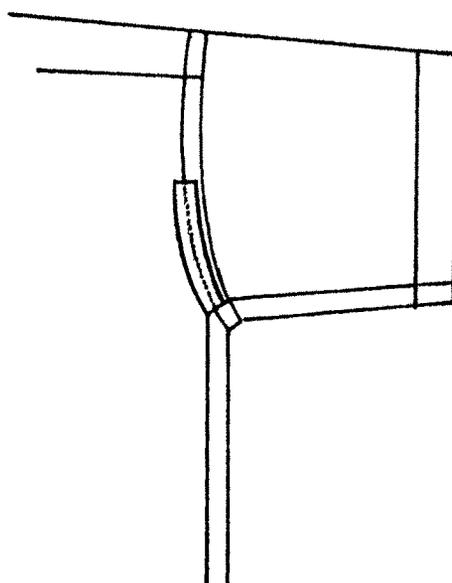
ARM HOLE SEAM AT
THE BACK REINFORCED
WITH BIAS TAPE

FIGURE - 40

whenever it is worn out. It would only require to rip open half armhole seam to insert the patch without any other alteration in the shirt.

At the point of maximum strain 12 cms long tape was placed along the curve of the back armhole (Figure 40) to strengthen the armhole seams. A second line of stitching along the length of the tape was done with slightly short stitches.

Evaluation of Designed Garments

Table 11

Mean scores on trousers and shirt for Subject F

Garment	Ease of wearing	Manipulation of fasteners	Fit of the garment	Appropriate-ness of the pattern for the disability	Appearance of the pattern child when garment is put on	Its comfort	Ease of removing
				Mean Scores (Range 1-5)			
Lower garment							
Trousers	4.3	-	4.5	4.6	4.6	4.6	4.3
Upper garment							
Shirt	4.6	-	4.6	4.8	5.0	4.8	4.6

The ratings for trousers ranged from 4.3 to 4.6 and for shirt 4.6 to 5 which was equal to very good. This indicated that :

(a)　easy fit allowed greater freedom of movements and lessened the strain from appliances,

(b)　suitable openings facilitated dressing easier,

(c)　reinforcements applied at the points of maximum wear to give protection, and

(d)　proper cut and design made the deformity less noticeable.

These were found to be suitable features.

Case Study 7

<u>Subject G</u>:

A nine year old girl was disabled by polio-paralysis in both the legs before she could complete one year. She lived with her grandmother who was very fond of her. She wore full length calipers with pelvic belt and used underarm crutches to move around. She attended the Crippled Home school regularly inspite of her disability.

She normally wore dresses, which had three-fourth opening in the front or at the back and bodice attached to the skirt (Plate 22). Although she was independent in her dressing care, the fastening located at the back was done by somebody. The use of appliances and body deformity created quite a few problems in her clothing.

The problems in her upper garments were:

1. Armhole and waistline seams ripped open as a result of strain from the crutches.

The investigator tried to solve the above problems by:

<u>Choosing a style that would reduce strain on the garment</u>

A loose fit which reduces strain on the garment was necessary for her as the crutches caused problems of wear and tear in the dresses which she wore. Loose fitting was also necessary for her

PLATE – 22

SUBJECT–G IN HER USUAL CLOTHES
AT SCHOOL

for freedom of actions when walking with appliances. In addition convenience in getting into the garment was important because she had poor balance and restricted movements. Since two-piece garments are more comfortable, allow greater freedom of body movements and are easy to put on and take off than one piece garment. A blouse worn over skirt was chosen as a suitable style of clothing for her disability. Therefore a blouse was drafted (Diagram 54, 55).

<u>Drafting instructions for Blouse</u>: (Subject G)

    <u>Measurements</u>

1. Blouse length   = 34 cms

2. Round neck   = 27 cms

3. Bust girth   = 54 cms

4. Waist girth   = 54 cms

5. Shoulder to waist length   = 24 cms

6. Shoulder width   = 26 cms

7. Sleeve length   = 12 cms

8. Round sleeve   = 18 cms.

<u>Front and Back</u>: (Diagram 54)

A - D = Blouse length = 34 cms

A - B = One-fourth of the bust girth = 13.5 cms

A - C = Highest shoulder to waist level = 24 cms

E - A = One-sixth of the round neck plus 1 cm = 4.5 + 1
   = 5.5 cms

DRAFT OF BLOUSE (SUBJECT·G)

SCALE=1/4
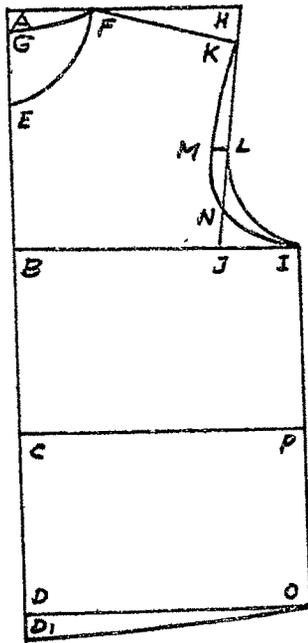
## DIAGRAM·54

DIAGRAM·55

F - A = One-sixth of the round neck = 4.5 cms

G - A = 1 cm

Join E-F with a curve for the front neckline and G-F for the back neckline.

H - A = Half shoulder width = 13 cms

I - B = One-fourth of the bust girth plus 2.5 cms = 13.5 + 2.5 = 16 cms

B - J = A-H less 1.5 cm = 13 - 1.5 = 11.5 cms

Connect H-J.

H - K = 2 cms

Connect F-K.

L - J = Half the measurement from J-K

M - L = 1 cm

N - J = 2 cms

Connect K-M-N-I for the front scye and K-L-I for the back scye as indicated on the diagram.

O - D = B-I = 16 cms

O is perpendicular to I.

O - P = D-C = 10 cms

D_1- D. = 1.5 cm

Join D_1-O with a slight curve.

Collar: (Diagram 55)

A - B = 6 cms

B - C = Half the round neck plus .5 cm = 13.5 + .5 = 14 cms

A - D = B-C = 14 cms

D - E = 2.5 cms

C - F = 1 cm

 Complete the draft according to the diagram.

To reduce the strain on the armhole, two loose fitting blouses with open collar and large armholes were adapted and constructed.

Blouses:

Blouse A - with kimono sleeves (Diagram 56) (Plate 23).

Blouse B - with raglan sleeves (Diagram 57) having 4 cms inverted
  pleat set at the centre back of the neck (Diagram 58)
  (Figure 41) (Plate 24).

These two styles of sleeves were chosen for comfort, and to allow more looseness in the armhole area and across the back for free shoulder movements while using the crutches.

Short and loose elbow length sleeves were made for the blouses to permit greater ease in arm movements.

The blouses with front full opening were made for convenience of wearing and closing buttons while dressing in a sitting position.

The length of the blouses were kept 10 cms longer than the waist length to avoid a gap between the blouse and the skirt while walking with crutches.

ADAPTATION FOR KIMONO SLEEVE

SCALE = 1/4
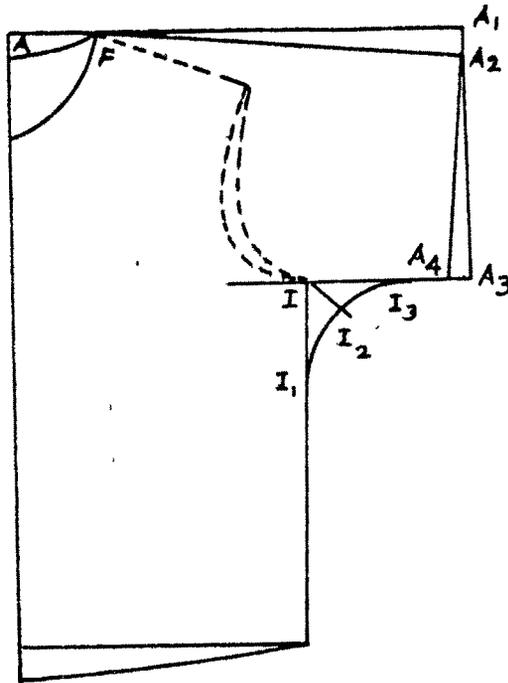
DIAGRAM - 56

INSTRUCTIONS:-

A_1 - A = HALF SHOULDER WIDTH PLUS
SLEEVE LENGTH = 13 cms + 12 cm
= 25 cms.

A_2 - A = 1 cm
CONNECT F - A_2
EXTEND A_1 AND I
A_4 - A_3 = 1 cm
CONNECT A_2 - A_4
I_2 - I = 2.5 cms
I - I_1 AND I - I_3 = 5 cms.
CONNECT I_1 - I_2 - I_3 WITH A CURVE
FOR ARM HOLE

PLATE – 23

KIMONO SLEEVE BLOUSE AND FLARED
SKIRT FOR FREEDOM OF ACTIONS
WHILE WALKING WITH APPLIANCES.

ADAPTATIONS FOR RAGLAN SLEEVE
AND FULLNESS ACROSS THE SHOULDER
SCALE = 1/4
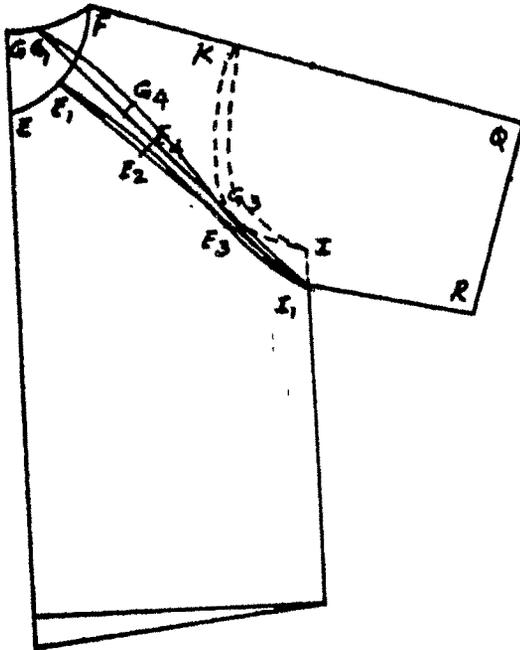
DIAGRAM - 57

INSTRUCTIONS:-

$E_1 - G_1$ = HALF MEASUREMENT FROM E-F, G-F RESPECTIVELY

$I_1 - I$ = 2·5 CMS
   CONNECT E_1-I, AND G_1-I_1

Q FROM K = SLEEVE LENGTH = 12 CMS.

R FROM Q = HALF ROUND SLEEVE = 11 CMS.
   CONNECT $I_1 - R$

DIVIDE E_1-I, AND G_1-I_1 INTO 3 EQUAL DIVISIONS

$E_4 - E_2$ AND $G_4 - G_2$ = ·5 CMS.

CONNECT $E_1 - E_4 = E_3 - I_1$

AND $G_1 - G_4 - G_3 - I$ WITH SLIGHT CURVE

FOLLOW SAME PROCEDURE FOR SLEEVE
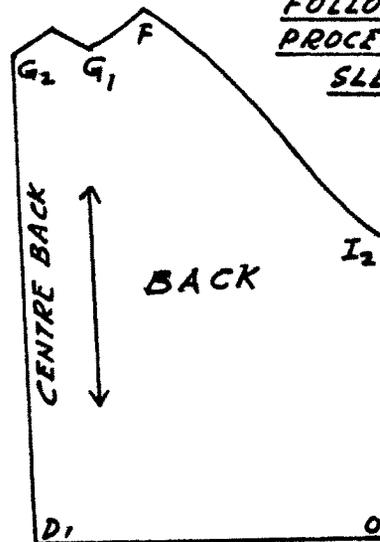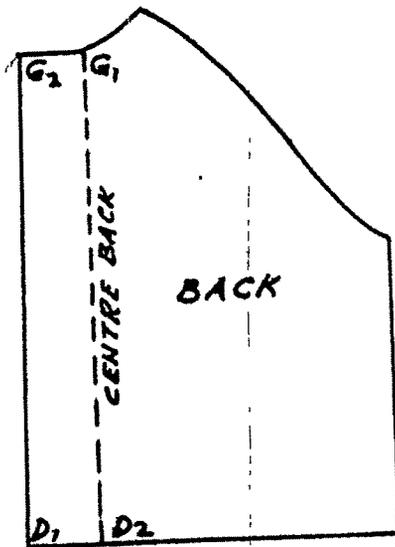
BACK

BACK

FINAL PATTERN

INSTRUCTIONS:-

$G_2 - D_1$ = 4 CMS FROM $G_1 - D$

DIAGRAM - 58

BLOUSE WITH RAGLAN SLEEVE AND INVERTED PLEAT SET AT THE CENTRE BACK NECK
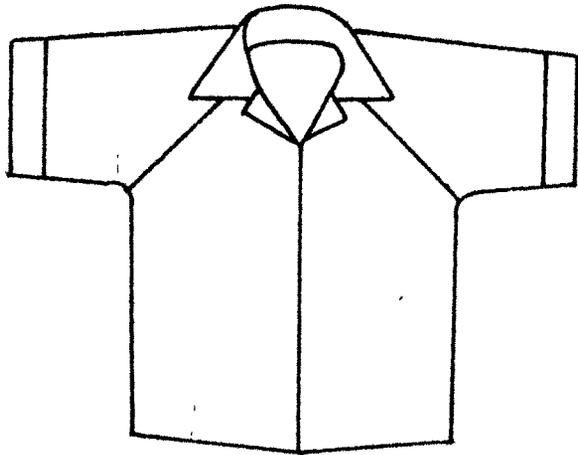
FRONT VIEW
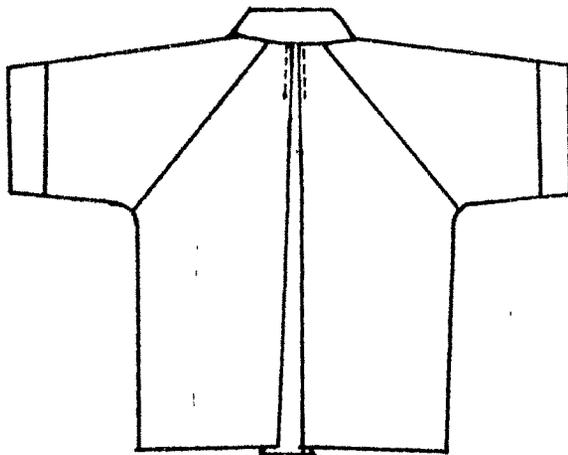
BACK VIEW

FIGURE - 41

PLATE – 24

BLOUSE WITH AN INVERTED PLEAT AT
THE BACK FOR LOOSENESS ACROSS
SHOULDER WHILE MANIPULATING THE
CRUTCHES. WRAP AROUND PLEATED
SKIRT WITH PLAIN FRONT LIKE KILT.

<u>Putting reinforcement at the point of maximum strain for the</u>
<u>sleeves</u>

Seams of the sleeves were strengthened at thé places where maximum strain could occur while manipulating the crutches. Underarm seam of the kimono sleeve was reinforced with twill tape[1] as shown in Figure 42. For the raglan sleeve only an extra line of stitching shortening the stitches along the shoulder seam was done (Figure 43).

To provide adequate freedom of movements for leg and hip action while walking with appliances; to simplify dressing when seated; and to accommodate orthopaedic appliances, two skirts and a culotte with different features were constructed.

<u>Drafting instructions of basic Skirt</u>:   (Subject G)

    <u>Measurements</u>

1. Skirt length   = 31 cms

2. Waist girth   = 54 cms

3. Hip girth   = 58 cms

4. Crotch length = 18 cms.

<u>Front and Back</u>:   (Diagram 59)

A - C = Skirt length = 31 cms

B - A = One-eighth hip girth plus 2 cms = 7.3 + 2 = 9.3 cms

    Extend A-B-C on right.

---

[1] V.Cotton (Edit.) <u>Reader's Digest Complete Guide to Sewing</u>. New York: The Reader's Digest Association, Inc., 1976, p.259.
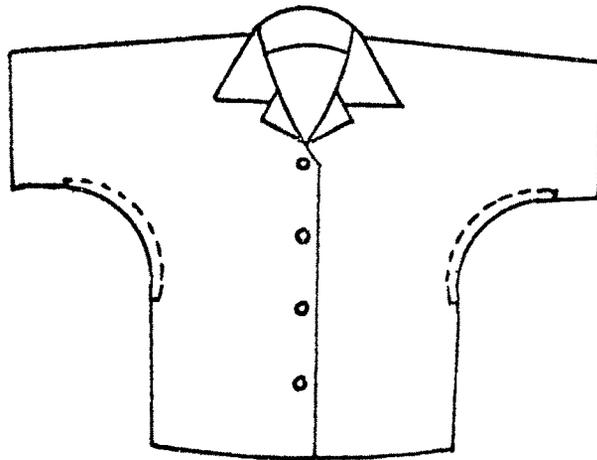
REINFORCEMENT UNDER THE ARM FOR
KIMONO SLEEVE
FIGURE- 42
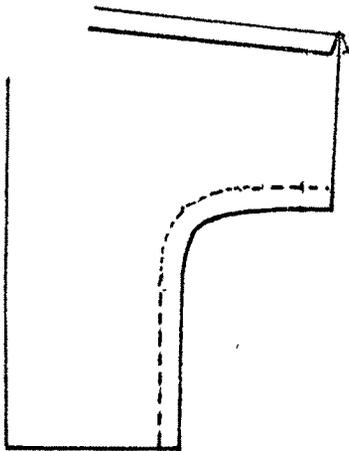
1.

WITH RIGHT SIDES FACING
MATCH, PIN AND BASTE
FRONT TO BACK AT UNDER
ARM SEAM LINE. STITCH
SHORTENING STITCHES
ALONG CURVE. PRESS FLAT.
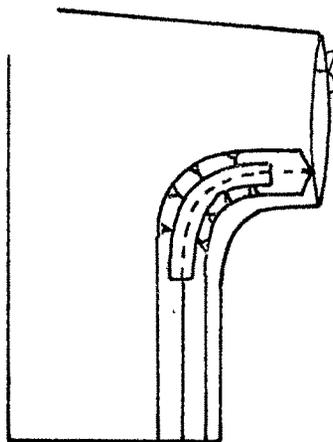
2.

CLIP SEAM ALLOWAN-
ESS ALONG CURVE,
PRESS UNDERARM
SEAM OPEN. CENTRE,
PIN AND BASTE A 12
CMS PIECE OF TWILL
TAPE ALONG CURVED
SEAM LINE. BE SURE
STITCHES GO TO
RIGHT SIDE.
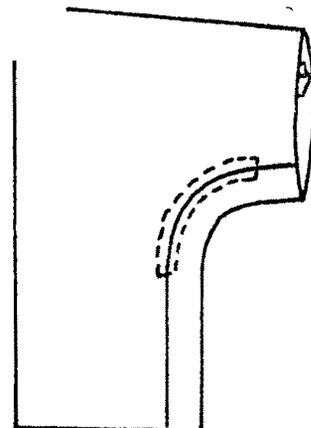
3.

FROM THE RIGHT SIDE
STITCH THROUGH ALL
THE THICKNESSES
APPROXIMATELY
·5 CMS. ON EACH SIDE
OF BASTED LINE.
SECURE THREAD END
ON WRONG SIDE.
REMOVE BASTING
AND PRESS

## AN EXTRA LINE OF STITCHING FOR SHOULDER SEAM OF RAGLAN SLEEVE TO STRENGTHEN IT

BACK
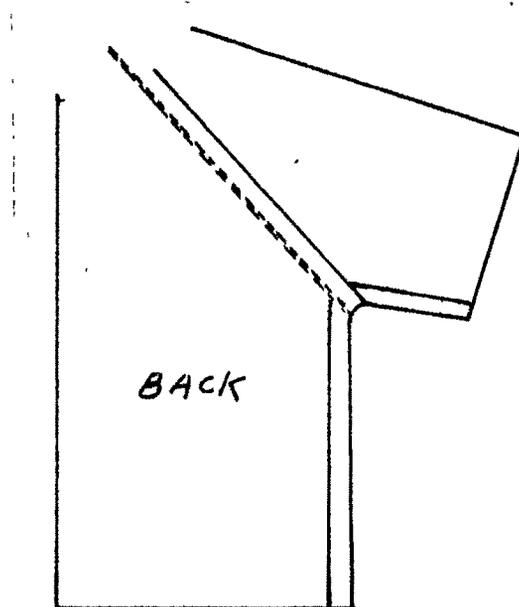
FIGURE - 43

DRAFT OF BASIC SKIRT (SUBJECT-G)

SCALE = 1/4
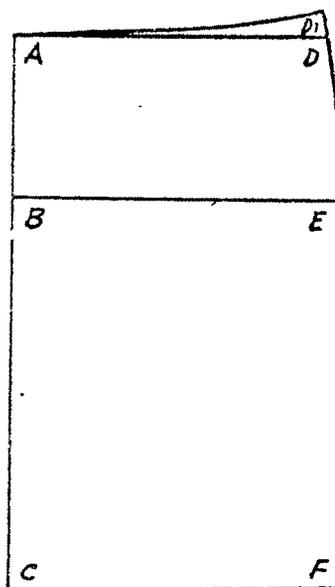
DIAGRAM - 59

D - A = A quarter of the waist girth plus 4 cms = 13.5 + 4
= 17.5 cms

E - B = A quarter of the hip girth plus 4 cms = 14.5 + 4 =
= 18.5 cms

F - C = EB = 18.5 cms

Connect F-E-D and continue to D_1 which is 1 cm from D.

Join D_1-A as shown in the diagram.

Skirts:

(a) Wrap around flared skirt

A wrap around flared knee length skirt (Diagram 59, 60)
(Figure 44) with moderate fullness at the waist was constructed.
Extra fullness at waist was adjusted by means of gathers to make
it roomy to wear over the pelvic belt. The waist band could be
fastened in the front (Plate 25) with the hook and a bar and a
press button inside to keep flap in place. The pockets were
placed in the side seams to avoid bulging outside.

(b) Kilt

The second skirt was wrap around knee length kilt
(Diagram 61) (Figure 45) with a plain wrap in the front. Fullness
at waist was added by knife pleats. It could be fastened with
button and buttonhole in the front.

(c) Culotte

Since a culotte gives more freedom to walk and causes less
worry of exposure, it seemed to be a suitable garment to make

# ADAPTATION FOR WRAP AROUND FLARED SKIRT (SUBJECT-G)
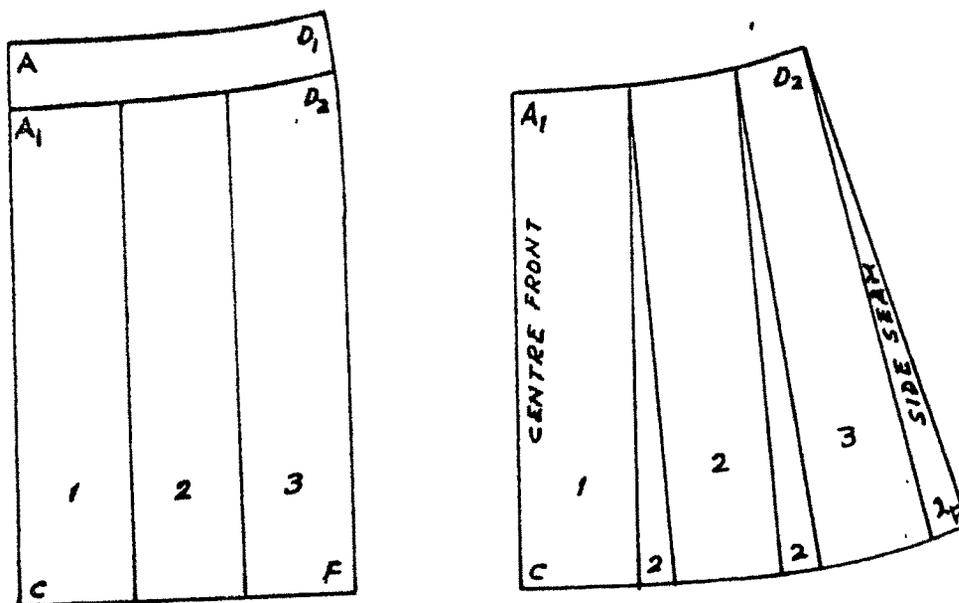
DIAGRAM - 60

INSTRUCTIONS:-

$A_1 - D_2 = 3.5$ cm FROM A-D, FOR WAISTBAND.

DIVIDE $A_1 - D_2$ AND C-F INTO THREE EQUAL PARTS. SLASH VERTICALLY AND SPREAD APART ADDING 6 CMS AT C-F AS SHOWN. CONNECT D_2-F.

GATHERS A_1

CENTRE FRONT

FRONT
RIGHT SIDE

C_1
C_2
C_3 C

A_2 G A T HERS A_1

INSIDE FLAP

CENTRE FRONT

FRONT
LEFT SIDE

C_1 C

GATHERS

BACK

CENTRE BACK

FOLD
A   C
B   D
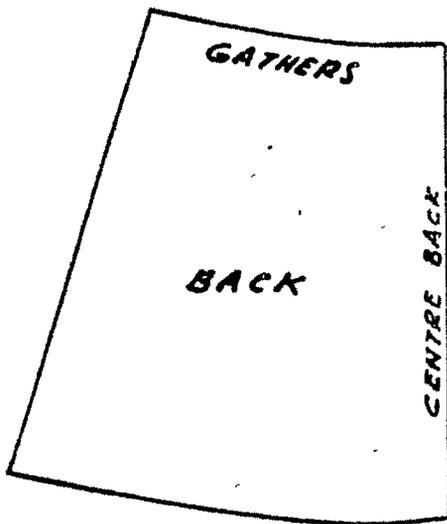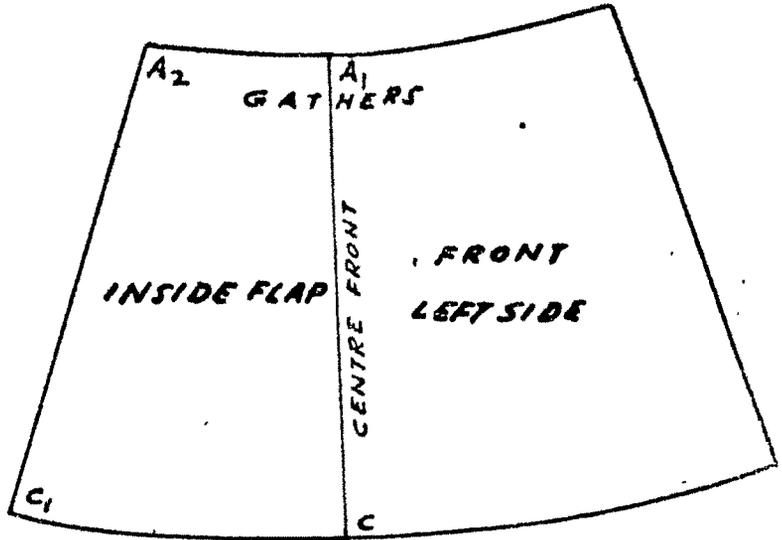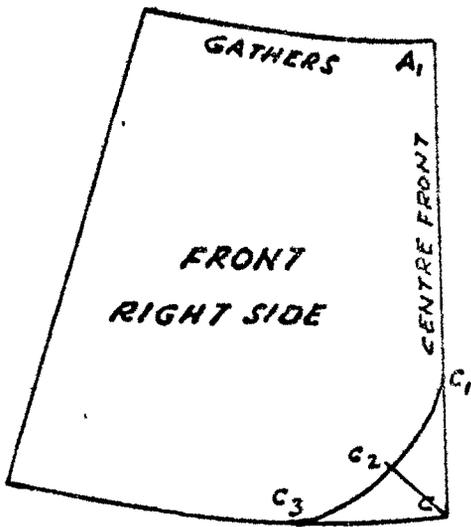
WAIST BAND

INSTRUCTIONS:-

FRONT RIGHT SIDE
$C_1 - C_3 = 8$ cms FROM C
$C_2 = 4$ cms FROM C AT $45°$
CONNECT $C_1 - C_2 - C_3$

INSIDE FLAP:-
$A_2 - A_1 = 10.5$ cms.
$C_1 - C = 19.5$ cms.
CONNECT $A_2 - C_1$

WAIST BAND:
$A - B = 3.5$ cms
$A - C = 32$ cms
$D - C = A - B$

WRAP AROUND FLARED SKIRT
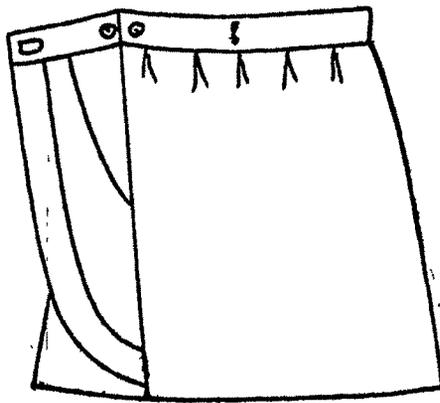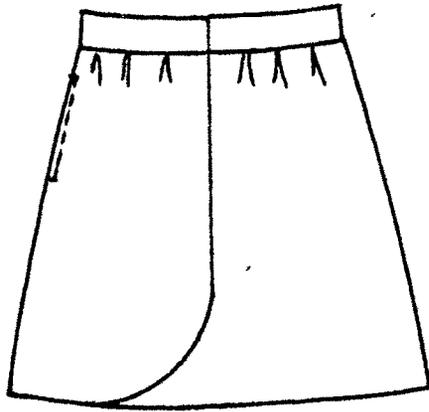
## FIGURE - 44

PLATE – 25

WRAP AROUND SKIRT SHOWN IN
FIGURE–44 WITH FASTENERS IN FRONT
FOR CONVENIENCE IN DRESSING WHILE
SEATED.

KILT

PLAIN WRAP

PLEATS

3 cms.

A E C

1 2 3 4 5 6 7

F O L D

B F D

WAIST BAND

A C
B D

FOLD
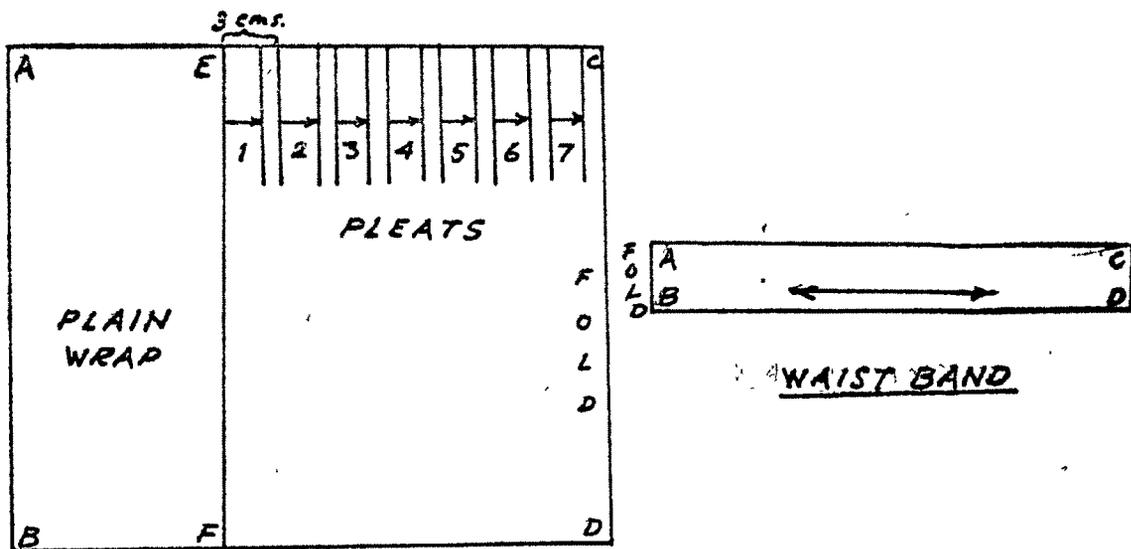
INSTRUCTIONS:-

A - B = LENGTH - WAIST BAND
= 31 - 3·5 = 27·5 CMS.

PLEAT WIDTH = 2 CMS (READY)

DISTANCE BETWEEN TWO PLEATS = 1 cm

A - C = WRAP WIDTH + 7 PLEATS + DISTANCE
BETWEEN TWO PLEATS.
= 12 + 42 + 7 = 61 CMS.

7 X 3 = 21 X 2 = 42 + 12
= 54 (WAIST GIRTH)

D - B = A - C = 61 CMS.

E - A = 12 CMS FOR WRAP

F - B = E - A = 12 CMS.

WAIST BAND

A - B = 3·5 CMS ON FOLD

C - A = HALF ROUND WAIST
GIRTH = 27 CMS.

D - B = C - A = 27 CMS.

DIAGRAM-61

KILT
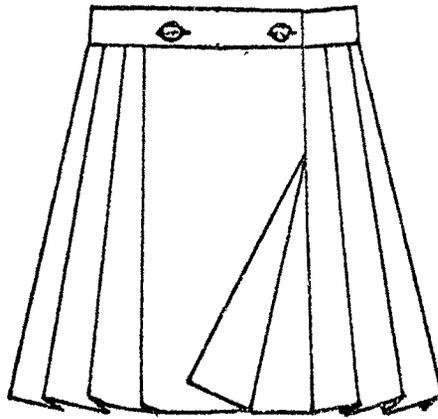
FIGURE - 45

ADAPTATION FOR CULOTTE

WAIST BAND
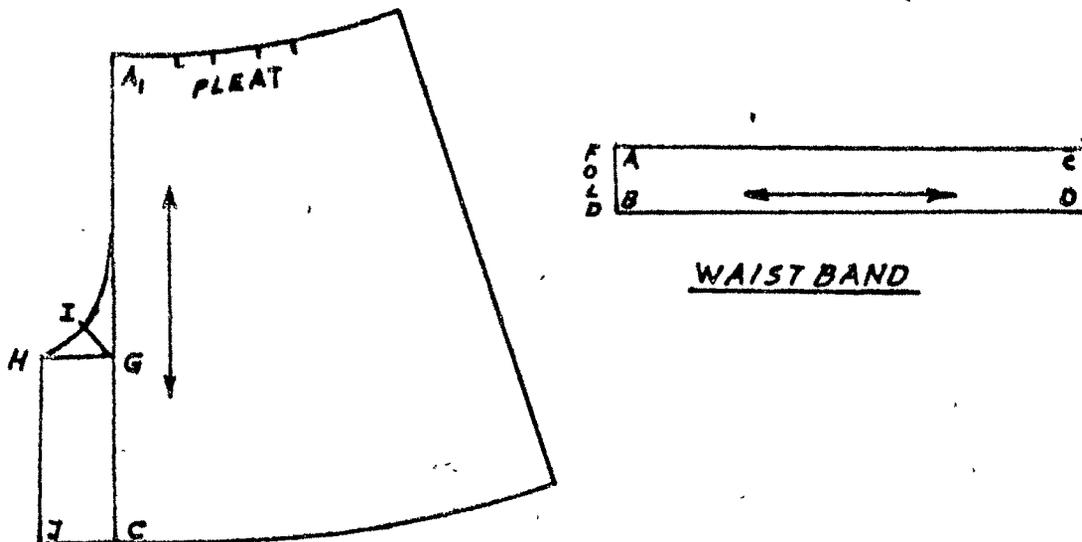
DIAGRAM - 62

INSTRUCTIONS:-

FRONT AND BACK

$G - A_1$ = CROTCH PLUS 2 CMS LESS
WAIST BAND
= $18 + 2 = 20 - 3.5 = 16.5$ CMS.

$H - G$ = ONE SIXTEENTH OF THE
HIP GIRTH = 3.6 CMS.

$I - G$ = HALF MEASUREMENT
FROM G TO H PLUS 1 CM
AT $45° = 1.8 + 1 = 2.8$ CMS.

CONNECT H-I-A, AS INDICATED
ON THE DIAGRAM

$J - C$ = HG = 3.6 CMS CONNECT H-J

WAIST BAND

$A - B$ = 3.5 CMS ON FOLD

$C - A$ = HALF ROUND WAIST
GIRTH = 27 CMS.

$D - B$ = $C - A$ = 27 CMS.
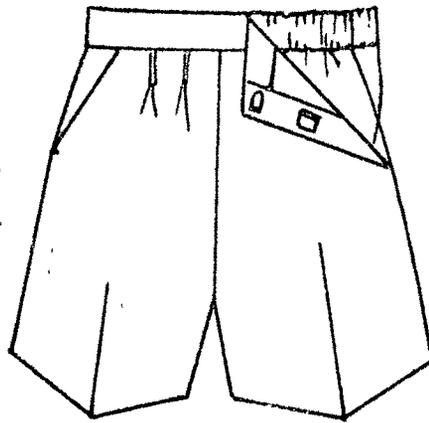
CULOTTE

FIGURE - 46

for her (Diagram 62) (Figure 46).

Two pleats were stitched on either side of the front and gathers at the back of the culotte to make it roomy to wear over the calipers. It was kept wide at bottom. Opening was kept at the side. Metal hook-bar and 3 cms long Velcro dabs were used to close it. Pockets were stitched inside the seam to keep front plain.

Evaluation of Designed Garments

Table 12

Mean scores on upper and lower garments for Subject G

Garment	Ease of wearing	Manipula- tion of fasteners	Fit of the garment	Appropriate -ness of the pattern for the disability	Appearance of the child when garment is put on	Its comfort	Ease of removing
				Mean Scores (Range 1-5)			
Upper garment							
Blouses -							
1. with kimono sleeve	4.8	4.6	4.8	4.5	4.6	4.8	4.6
2. with raglan sleeve having inverted pleat at the back	4.8	4.6	4.5	4.6	4.1	4.6	5.0
Lower garment							
Skirts -							
1. wrap around flared skirt	4.8	4.8	4.8	4.6	4.6	4.6	5.0
2. kilt	4.6	4.8	4.1	4.3	4.5	4.8	5.0
3. culotte	3.3	3.6	4.3	4.0	3.8	4.3	3.8

Table 12 gives the ratings on upper and lower garments for Subject G. The mean score on different criteria for blouse with kimono sleeve ranged from 4.5 to 4.8, and for raglan sleeve 4.1 to 5 which was equal to very good. It should be noted from the same table that though both the styles were less constructive and provided looseness at underarm for free movements, still in the opinion of the judges the appearance of the subject was better in blouse with kimono sleeve than in raglan sleeve. The possible reason could be that raglan sleeve pulled up more at underarm while walking with crutches which formed the fold of material at underarm (Plate 24).

The mean score for ease of wearing was 3.3 and for ease of removing 3.8, which were lowest for the culotte. However the skirts of the open flat style, which could be wrapped around with fasteners in the front proved easy to put on and take off in a sitting position. And also it was convenient to wear it over the calipers. The culotte seemed to be more difficult to wear over calipers since she had restricted movements.

The subject was asked to give her opinion about the designed garments. She moved her shoulder with smile and said "I feel comfortable in them". This reveals that two piece style-blouse worn over skirt, loose armholes like kimono and raglan and fullness in skirts certainly made her feel comfortable in the designed garments than her usual dress.

253

PLATE-26

SUBJECTS ON THE STAGE FOR THE CELEBRATION OF THE
INTERNATIONAL YEAR OF THE CHILD 1979 WITH THEIR
GARMENTS DESIGNED BY THE INVESTIGATOR BY THE
DEPARTMENT OF CLOTHING AND TEXTILES.