Chapter 6 "Point, line and direction construction"

Contents

In this chapter you will learn about the essential tools for point and line construction and construction of rectangles and circle arcs. These functions are all contained in the p+l+c+r menu (points+lines+circles+rectangles).

The point and direction construction is very important. Therefore, each section already contains detailed exercises. At the end of the chapter all functions are practised in conjunction. Please read the explanations and perform all exercises.

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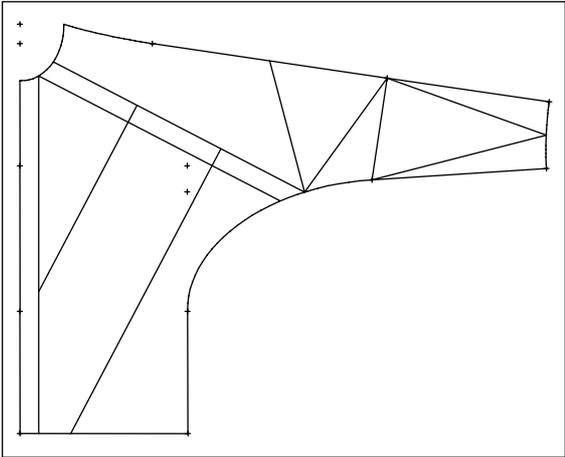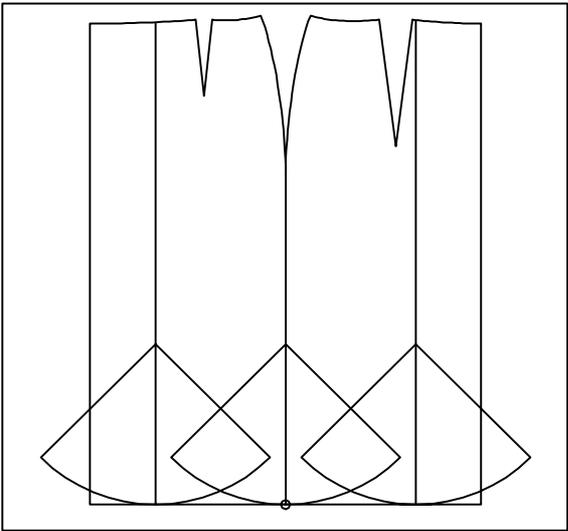
6.1 The sub-menu point construction

Significance of point construction
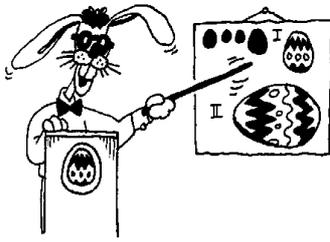
Each line consists of starting and final point and additional fulcrums, if necessary. The construction of starting and final point influences the position and shape of the lines during grading with GRAFIS to a great extent. The advantages of automatic similar construction can only be utilised fully if each construction step and thus, each point construction is carefully thought through in relation to the other sizes. In the base size it makes no difference whether a point is placed 20 mm or 20% down a 100 mm long line. As soon as similar construction is called and the overall length of the line changes between the sizes, there is a difference between the two ways of constructing a point!

The sub-menu point construction

The sub-menu point construction is used for construction of new points as well as being opened automatically for certain construction steps such as

- during construction of the starting point of the cutting line under *separate* and *p+digi,*
- when setting *symbols*
- during *insert* of objects and selecting the insert transformation
- with *transform* objects,
- during construction of starting and final point of *curves,*
- for the construction of new points and lines and much more.

For the construction of a new point the menu is opened via *p+l+c+r | p_____*. First, call the basic block "kimono" and then, open the sub-menu point construction. The construction of a point can ensue according to eight different principles.

digi -freehand point

Step-by-step guide
⇒ *p+l+c+r | p___*
⇒ Activate the function *digi*
⇒ Set the new point freehand

With *digi* a point is set freehand and is located at the same position in all sizes.

point constr.
----
click p
click l
click pl
intersectn
p on x&y
x=   .0
y=   .0
rlg on l
rlg= 50.0
plg on l
plg=100.0

In picture 6-1 the point is marked with a circle. The point set with *digi* remains at the same position in both sizes. Freehand points should be avoided and used only as an exception as they do not contain any grading information.

digi point
in size 40   in size 44

stacked at the front
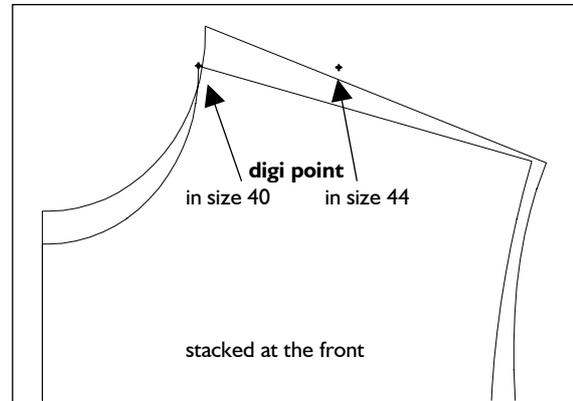
Picture 6-1

Call the basic block "shirt blouse", delete all points and then open the sub-menu point construction via *p+l+c+r | p_____*. Activate *digi*. In the base size, construct a point at the corner shoulder/neck. Grade the block in size 44 and stack the patterns at the centre front *le-down* (Picture 6-1). *Digi*-points are not linked to the construction. They are located at the same position in relation to the co-ordinate source (here: intersection centre back / neck). If you stack the patterns at the centre back (*ri-up*) the two points lie on top of another.

click p - point out of an existing point

Step-by-step guide
⇒ *p+l+c+r | p_____*
⇒ Activate *click p*
⇒ Click the point

With **click p** the new point is linked to an existing point and graded with this point.
Reset the construction back to construction step 001. Activate *click p* and move the cursor over the pattern. A thin thread extended from the cursor (thread cursor) marks the position where a new point would be placed after ⌐. With *click p* the thread cursor points to existing points of the construction, only. Construct a new point with *click p*. It blots out the existing point of the construction and is invisible on screen. This effect was already explained in section 4.5 relating to lines. Point construction with *click p* is used for the construction of starting and final points of lines and curves, amongst others. Reset the construction record to 001.
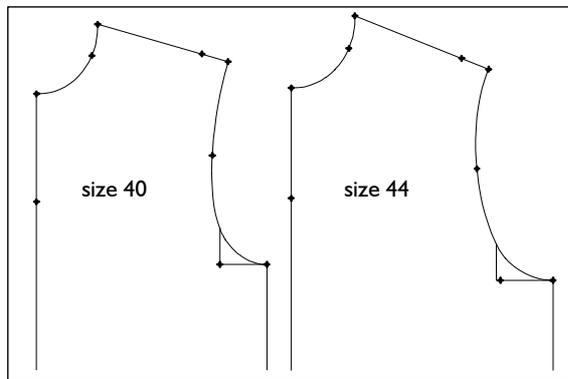
_____

click l - **point on line**

Step-by-step guide
⇒ *p+l+c+r | p_____*
⇒ Activate *click l*
⇒ Click the line

With ***click l*** a new point is constructed on a line at the position closest to the cursor. During grading this point is moved **relative** to the length of the line. With this construction option it is important to make sure that the base line is not unnecessarily linked to another line across a corner. A point on the side seam is graded differently if the side seam is linked to the hem. In this case the point is not moved relative to the length of the side seam but relative to the length of side seam plus hem.

Picture 6-2

First, delete all points of the basic block "shirt blouse", activate *click l* and then move the cursor over the pattern, again. The thread cursor now shows the nearest line. The colour of the line changes. Construct all points according to Picture 6-2 in the base size. Then grade the pattern in size 44. The point on the auxiliary line at the lower armhole is no longer situated on the corner in size 44 because the auxiliary line is linked across the corner. Stack the pattern in different ways.

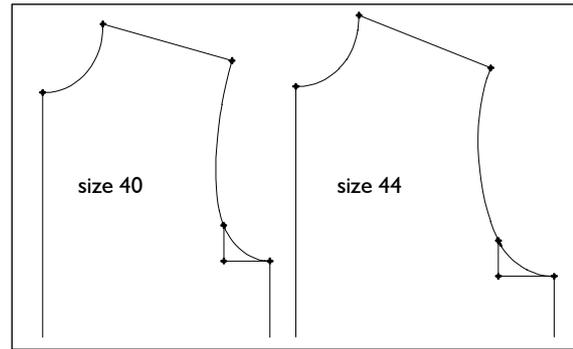*click pl* - **point on the fulcrum of a line**

Step-by-step guide
⇒ *p+l+c+r | p_____*
⇒ Activate *click pl*
⇒ Click the line

With ***click pl*** the point is constructed on the nearest fulcrum of a line or curve. Lines usually contain a minimum of two fulcrums, the starting and the final point. In GRAFIS, curves are saved as polygons, meaning they consist of a number of individual lines (Picture 6-4). The starting and final points of these lines are the fulcrums of the curve. They can be shown with *raster 0*.
Reset the construction record back to 002; all points are deleted. Activate *click pl*. The thread cursor now shows the starting or final points of lines. Construct

Picture 6-3

all points shown in Picture 6-3 and then grade the pattern in size 44. As opposed to the construction with *click l,* the point on the auxiliary line at the armhole remains on the corner, also in size 44 as it was constructed on the fulcrum of the auxiliary line.
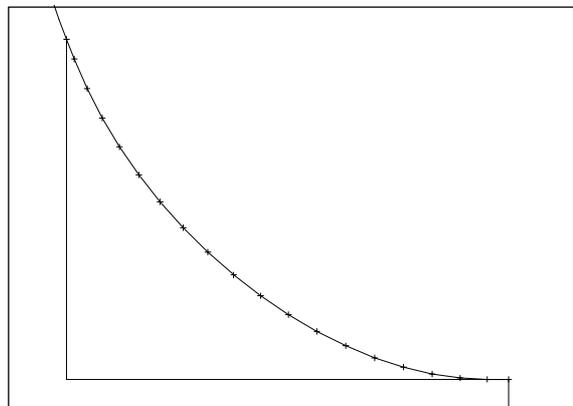
Picture 6-4

Zoom in to the lower part of the armhole or the neck (Picture 6-4) and move the cursor along the curve. You can see the fulcrums on which a new point would be constructed with *click pl*.

Intersection - **point on the intersection of two lines**
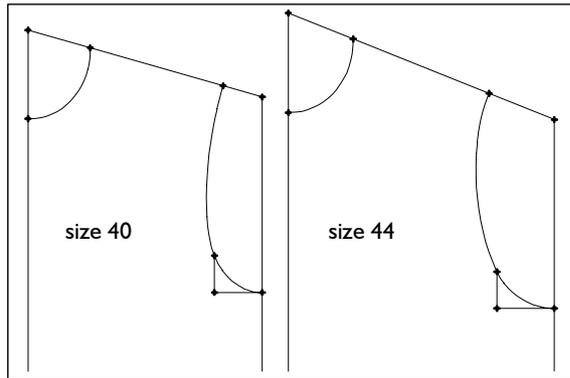
Step-by-step guide
⇒ *p+l+c+r | p_____*
⇒ Activate *intersectn*
⇒ Click the first line
⇒ Click the second line

With ***intersectn*** a point is constructed on the intersection of two lines or curves. The lines and/or curves are to be clicked one after the other, If more than one intersection is detected a question is posed. A point is also constructed if both lines intersect when extended, only (max. 500 mm).
Reset the record back to 002; all points are deleted. Activate *intersectn*. GRAFIS now expects you to click two lines one after the other. Click the neck (ft) first and then the centre front. The point is constructed on the intersection of the two lines. Continue to construct all points shown in Picture 6-5. Grade in size 44.
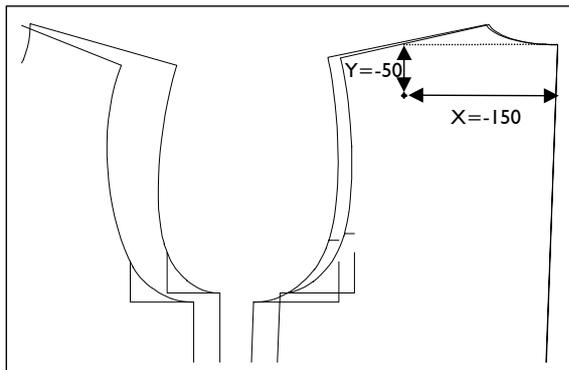
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Picture 6-5

p on x&y - point on x and y co-ordinates

Step-by-step guide

⇒ *p+l+c+r | p_____*
⇒ Enter parameters for *x=...* and *y=....*
⇒ Click on *p on x&y*

The position of all objects relates to the co-ordinate source, see section 4.3. With **p on x&y** a point is constructed with the x co-ordinate entered for **x=...** and the y co-ordinate entered for **y=...** After having entered the values ⌗ on *p on x&y* constructs the new point.
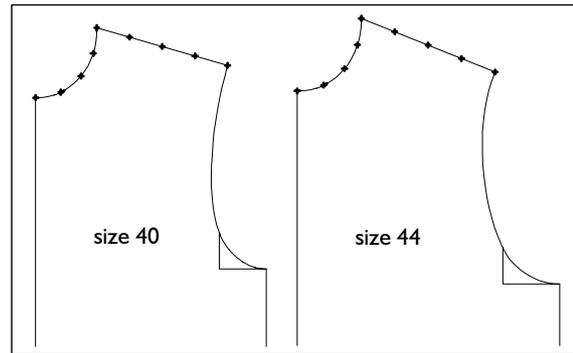

Picture 6-6

For the basic block "shirt blouse" the source is situated at the intersection neck/centre back. After entry of *x= -150.0* and *y=-50.0* and clicking on *p on x&y* the marked point with the entered co-ordinates is constructed (Picture 6-6). This function should only be used with "zero run constructions" or with construction parameters (chapters 11 and 12).

rlg on l - point on the relative length of a line

Step-by-step guide

⇒ *p+l+c+r | p_____*
⇒ Enter the parameter *rlg=....*
⇒ Activate *rlg on l*
⇒ Click the line, following the right principle

With **rlg on l** a point is constructed on the relative length of a line. The relative length in % relates to the total length of the line and is to be entered into the line *rlg=...* When clicking the line the right principle is to be followed, as the relative length is calculated from the beginning of the line.
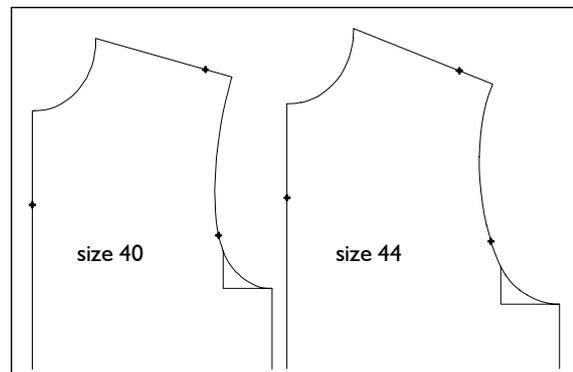

Picture 6-7

Reset the record back to 002. Enter *rlg=50.,* then activate *rlg on l* and construct the central points of the shoulder and neck (Picture 6-7). Note the direction indicator of the cursor. Enter *rlg=0.* and construct the starting points of the shoulder and neck in this way. Continue with *rlg=25.* and then grade.

plg on l - point on the partial length of a line

Step-by-step guide

⇒ *p+l+c+r | p_____*
⇒ Enter the parameter *plg=....*
⇒ Activate *plg on l*
⇒ Click the line, following the right principle

As opposed to *rlg on l*, **plg on l** generates a point on a partial length of a line. The required partial length is to be entered in the line *plg=...* Here also, the right principle is to be followed as the partial length is measured from the beginning of the line.

Picture 6-8

Reset the record to 002. Enter the value *plg=120.*, activate *plg on l* and click the shoulder so that the point is constructed 120 mm from the neck (Picture 6-8). The point on the armhole is to be constructed 170 mm from the shoulder and the point on the centre front is to be constructed 100 mm from the neck. Grade in size 44.

_____

6.2 Further point construction

The *p+l+c+r* menu

The *p+l+c+r* menu contains tools for the construction of **p**oints, **l**ines, **c**ircle arcs and **r**ectangles and can be called directly from the basic menu. Clicking *p____* leads into the sub-menu point construction which was explained in the previous section. In this section the four remaining options for point construction are to be introduced.

The remaining functions of the *p+l+c+r* menu for line, circle and rectangle construction are explained in the following sections.

```
    p+l+c+r
  -------------
 points:
 p_____
 p+d on line
  d = 20.0
 p+rel+p o.l
 p+rel+p
  rel= 50.0
 digi on p+p

   es:
  p ==> p
  p ==> px
  p ==> py
```

p+d on l - point with a distance to a base point on a line

Step-by-step guide:
⇒ *p+l+c+r*
⇒ Enter the parameter *d=*
⇒ Activate the function *p+d on l*
⇒ Construct the base point with the sub-menu point construction

With this function a point is constructed on an existing line with a defined distance to an existing point. The set distance is considered during grading. When clicking the line the right principle is to be followed.

size 40   size 44
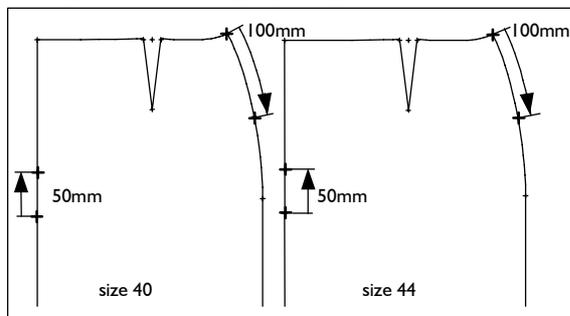
Picture 6-9

In Picture 6-9 two new points were constructed in the basic block 017 "skirt after Hohenstein", with the function *p+d on l*. For the point on the centre front enter *d=50* below the line *p+d on l* in the *p+l+c+r* menu. Clicking on *p+d on l* opens the sub-menu point construction to define the base point. Click the hip point on the centre front with *click p*. Then the base line is to be clicked. With the right principle you determine the direction in which the point is constructed. In the example in Picture 6-9 click to the right of the centre front. Construct the point on the side seam, also.

Should the base point not be placed on the base line, the construction begins at its perpendicular point on the base line. In Picture 6-10 the bust point is the base point. The new point was measured from its perpendicular point onto the centre front with a distance of 100 mm.
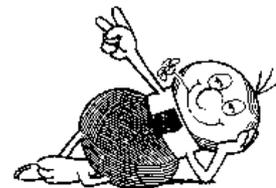

size 40   size 44
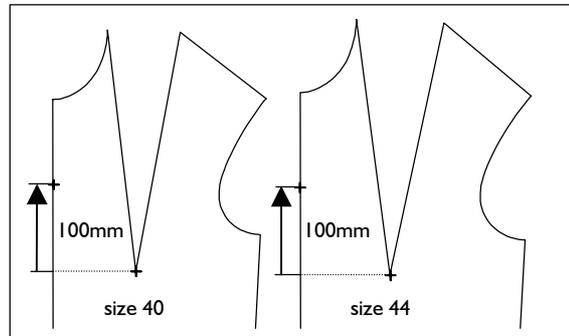
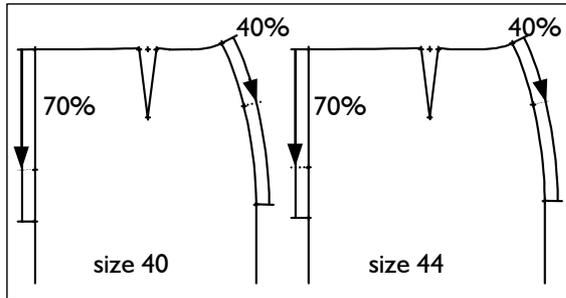Picture 6-10

p+rel+p on l - point between two points on a line

Step-by-step guide:
⇒ *p+l+c+r*
⇒ Enter the parameter *rel=*
⇒ Activate the function *p+rel+p on l*
⇒ Construct the first base point
⇒ Construct the second base point
⇒ Click the base line

The new point is constructed on the base line at a relative position between two base points. The distance between the base points is measured along the line.

As opposed to the example in Picture 6-9 the new points in Picture 6-11 were constructed at a relative length position. The basis is basic block 017 "skirt after Hohenstein", yet again. For the point on the centre front enter *rel=70* below the line *p+rel+p* in the *p+l+c+r* menu. Clicking on *p+rel+p* **on l** opens the sub-menu point construction to define the two base points between which the new point is to be constructed. Click the waist point and then the hip point on the centre front with *click p*. With this succession you define that the distance is measured from the waist. After having clicked the base line, (here: centre front) the new point is constructed. Continue with the point on the side seam.

Should the base points not be placed on the base line, their perpendicular points onto the base line are used.
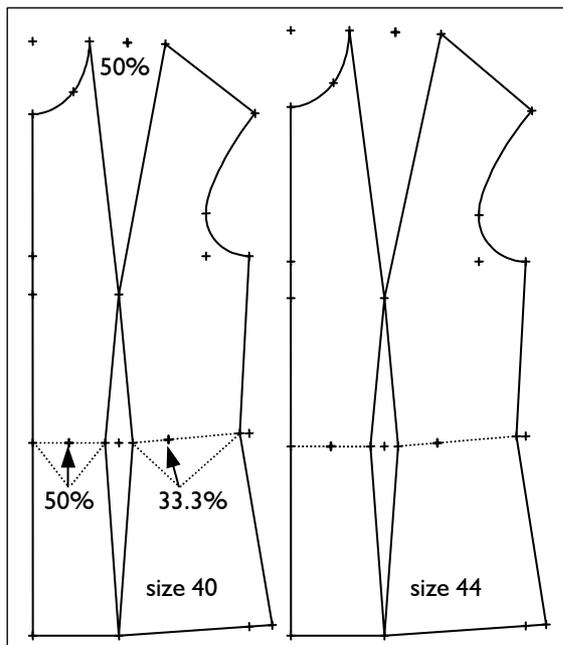

Picture 6-11

p+rel+p - point between two points

Step-by-step guide:
⇒ *p+l+c+r*
⇒ Enter the parameter *rel=*
⇒ Activate the function *p+rel+p*
⇒ Construct the first base point
⇒ Construct the second base point

The new point is constructed at a relative position between two base points. No base line is required. The position is determined relative to the first base point.

Picture 6-12

In Picture 6-12 three new points are constructed with the function *p+rel+p* in the basic block 001 "bodice with normal dart a. H.". For the bisector of the bust dart enter *rel=50* in the line below *p+rel+p*. After having clicked on *p+rel+p* and the two final points of the dart line, the new point is constructed.

Construct the central point on the waist line in the same way.

The third point is constructed by setting *rel* to 33.3. After having clicked on *p+rel+p* and the points on the waist line, the point is constructed. The succession in which the points are clicked determines the direction from which the 33.3% are measured. To get the result according to Picture 6-12 click the point of the waist dart, first and then the point at the side seam.

digi on p+p - digi point, bound onto two points

Step-by-step guide:
⇒ *p+l+c+r | digi on p+p*
⇒ Set digi point freehand
⇒ Construct the first base point
⇒ Construct the second base point

A point set freehand with *digi on p+p* is graded proportionally with the points it is bound to. The point marked in Picture 6-13 is bound onto the bust point and the sleeve point and graded proportionally.
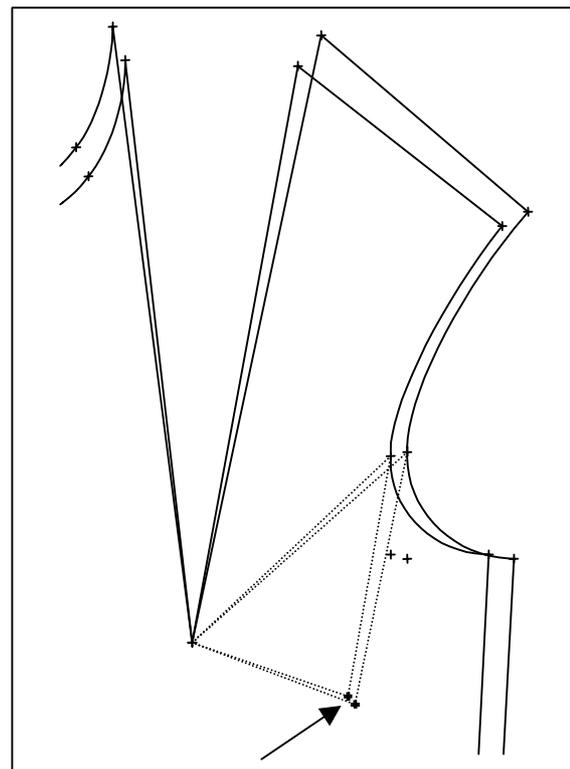
Picture 6-13

GRAFIS internally constructs a triangle between the three points and changes its size and position during grading but not its shape.

_____

Exercises

1st Exercise

Call the basic block "bodice with normal dart a.H", delete the back and all points in the front and construct the points shown (picture 6-14).

>   *call*
>   *delete*

1. Construct the sleeve notch P1 with the function *rlg on l.*

>   *p+l+c+r*
>
>   *p_____*
>   *rlg=0.0*
>   *rlg on l*

   Click the upper or lower armhole curve; note the direction.

2. Construct point P2 on the upper armhole curve with 25 mm distance to the sleeve notch with *p+d on line (or plg on l).*

>   *d=25.*   enter below *p+d on line*
>   *p+d on line*   activate

   Determine the sleeve notch as starting point with *click p* and click to the right of the upper armhole.

3. Construct point P3 30 mm from the sleeve notch on the lower armhole curve with *p+d on line (or plg on l).*

>   *d=30.*   enter below *p+d on line*
>   *p+d on line*   activate

   Determine the sleeve notch P1 as starting point with *click p*. Click next to the lower armhole curve on the correct side.

4. Point P4 is to be positioned on the centre front 15 mm from the neck. Use the function *p+d on l or plg on l.*

>   *d=15.*   enter below *p+d on line*
>   *p+d on line*   activate

   Determine the intersection CF/neck as base point with *click pl* and then click on the correct side of the centre front.

5. Point P5 is to be placed on the extension of the centre front 30 mm upwards from the neck.

>   *d=30.*   enter below *p+d on line*
>   *p+d on line*   activate

6. Point P6 is to be constructed on the neck at a relative length of 33.3% (measured from the shoulder). Use *p+rel+p o.l.* or *rlg on l.*

>   *rel=33.3*
>   *p+rel+p o.l.*

   Determine the base points with *click pl*. The first base point is the final point of the neck at the shoulder and the second base point is the neck point at the centre front.

7. Point P7 is to be constructed on the imaginary connection between the final points of the neck at a relative position of 33.3% (measured from the shoulder).
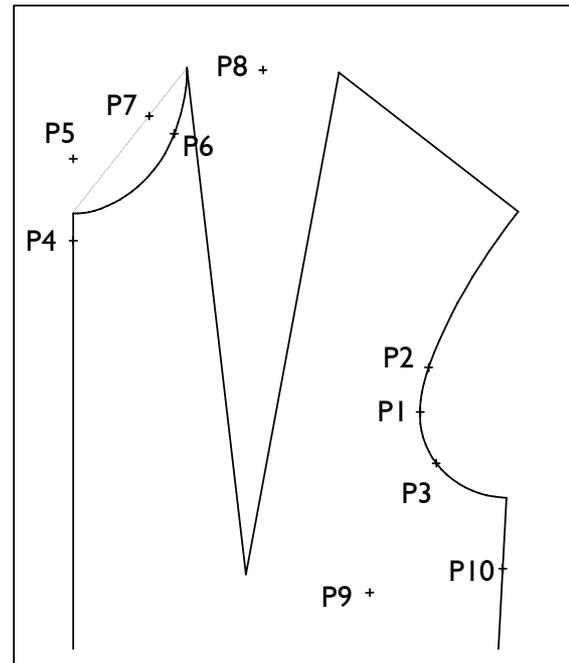
Picture 6-14

>   *rel=33.3*
>   *p+rel+p*

   After having entered the value for *rel* and having clicked *p+rel+p*, both end points of the neck are to be clicked. If you click on the end point at the shoulder, first you get the desired point P7.

8. Construct point P8 as an auxiliary point for the bisector of the angle between the final points of the dart lines.

>   *rel=50.*   enter
>   *p+rel+p*   activate

   After this, only the final points of the dart lines are to be clicked with *click pl* for example.

9. Point P9 is to mark the position the for an embroidered ornament. Construct the point P9 with *digi on p+p.*

>   *p+l+c+r*
>
>   *digi on p+p*   activate

   First, position the marking point freehand. Then, define the bust point and the sleeve notch as binding points with *click pl*.
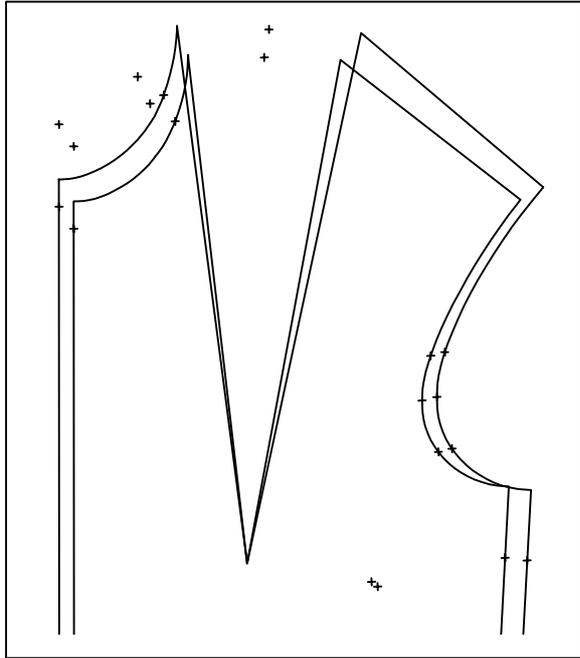
10. Point P10 is to be constructed on the side seam with a relative distance of 20% between the corner point armhole/side seam and the waist point.

>   *p+l+c+r*
>
>   *rel=20.*   enter
>   *p+rel+p o.l.*   activate

   First, click the corner point armhole/side seam with *click pl* and then the waist point at the side seam. Click the side seam as base line; note the direction.
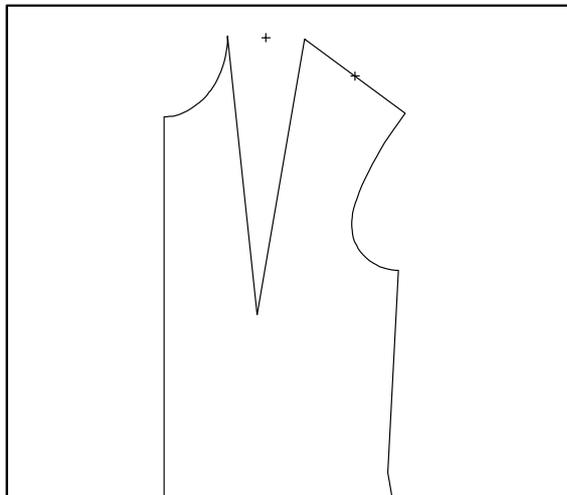
_____

Picture 6-15

Grade the construction in sizes 40 (base size) and 44. Analyse the positions of the ten points in size 44. The result must correspond to Picture 6-15.

2nd Exercise

In the bodice after Hohenstein construct (Picture 6-16)

• a point in the centre of the shoulder and
• a point in the centre between the dart lines for construction of a bisector of the angle

Picture 6-16

call
p+l+c+r
    p+rel+p o.l.
    p+rel+p

6.3 Construction of lines

The *p+l+c+r* menu

Apart from the functions for point construction which were already discussed in the previous two sections, the *p+l+c+r* menu also contains functions for the construction of lines. These functions are introduced in this section. A further line construction *p+dir+lg* is subject of the following section "direction construction".

p==>p - line between two points

Step-by-step guide:
⇒ *p+l+c+r*
⇒ Activate *p==>p*
⇒ Construct first point
⇒ Construct second point

With *p==>p* a line is constructed between two points. After having called this line construction the sub-menu point construction is opened for construction of the starting and final point of the line.

```
    p+l+c+r
    --------------
    points:

    p+d on line
     d = 20.0
    p+rel+p o.l
    p+rel+p
     rel= 50.0
    digi on p+p

    lines:
    p ==> p

    p ==> py
    p + digi
    p+dir+lg
     lg=200.0
    tang.p=>l
    perp p=>l

    rectangles:
```
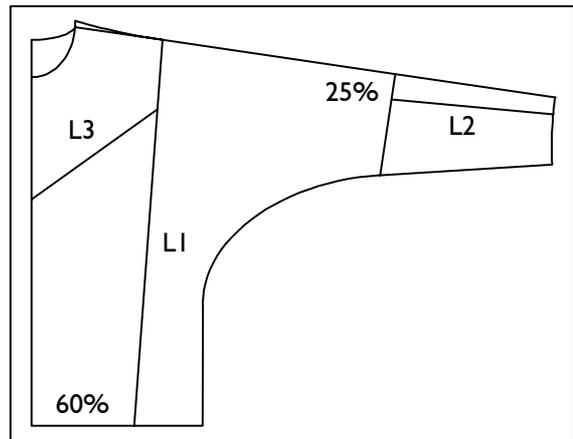

Picture 6-17

In Picture 6-17 line L1 was constructed between the construction point on the shoulder and the hem. After having activated *p==>p* select *click pl* from the point construction sub-menu and click the construction point on the shoulder. The final point of the line is determined with *rlg on l (rlg=60.)*.

Line L2 starts at ¼ of the elbow line and ends at ¼ of the wrist line. After having activated *p==>p* construct the starting and final points of the line with *rlg on l (rlg=25.)*, respectively.

Line L3 starts at the style line and ends at the centre front. Determine the position by eye (with *click l*).

p==>px - horizontal to the x co-ordinate of a point

p==>py - vertical to the y co-ordinate of a point

Step-by-step guide:
⇒ Activate the function *p==>px* or *p==>py*
⇒ Construct the starting point of the line
⇒ Determine auxiliary point for calculation of the final point
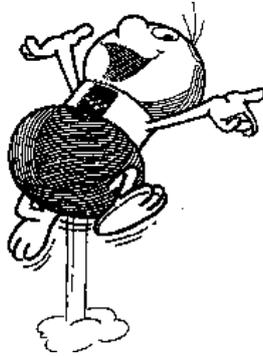
The functions *p=>px* and *p==>py* construct horizontal or vertical auxiliary lines. After having activated the respective function the starting point of the line is to be defined and then a second point is to be determined for calculation of the final point. For calculation of the final point with *p==>px* the x co-ordinate of the second point is applied, with *p==>py* the y co-ordinate is used.
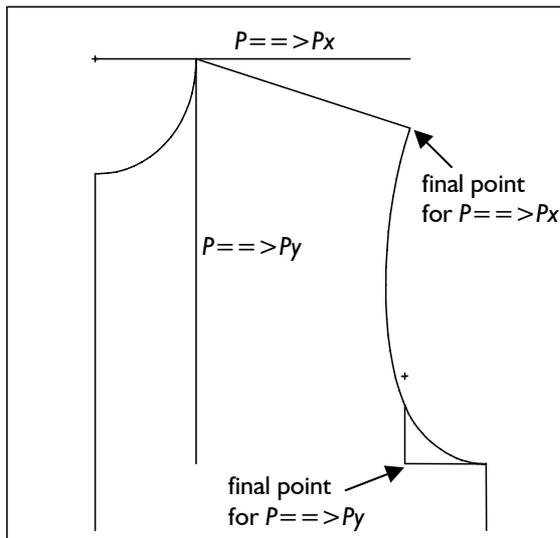
Picture 6-18

In Picture 6-18 the following was constructed in basic block 010 "shirt blouse":
• a horizontal auxiliary line from the neck construction point to the final point of the shoulder
• a vertical auxiliary line from the corner point shoulder/neck to the construction point of the armhole
   p+l+c+r
     p==>px
        click p   construction point neck
        click pl   corner shoulder/armhole
     p==>py
        click pl   corner neck/shoulder
   *click pl*   construction point armhole

p+digi - freehand line bound onto a point

Step-by-step guide:
⇒ Activate the function *p+digi*
⇒ Construct the starting point
⇒ Determine the final point freehand

This function creates a line with a fixed length in any direction. Length and direction are constant throughout all sizes. *p+digi* is particularly suitable for horizontal, vertical or oblique auxiliary lines.
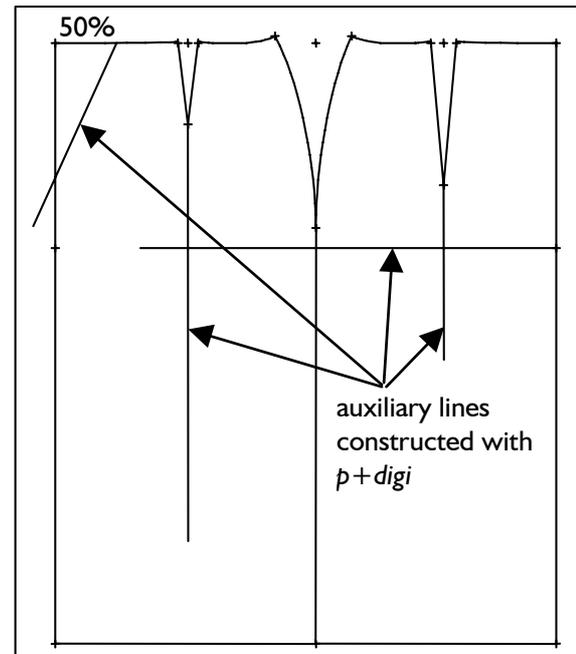
Picture 6-19

In Picture 6-19 a total of three lines was constructed with *p+digi*. After having activated *p+digi* the starting point of the line is to be defined with the point construction sub-menu. Length and direction of the line can then be determined by moving the cursor freehand. The preferred directions horizontal and vertical act like a magnet, the line "jumps" to these directions.
Construct all lines depicted in Picture 6-19 in the basic block 017 "skirt after Hohenstein". With *separate* the lines can be extended to the centre front or the hem. Grade sizes 40 and 44.

tang.p=>l - line as tangent to a line

Step-by-step guide:
⇒ Activate the function *tang.p=>l*
⇒ Construct the starting point
⇒ Click the line to which the tangent is to be created

With *tang.p=>l* a tangent to a line is constructed. After having activated *tang.p=>l* the starting point is to be determined. Then, the line to which the tangent is to be generated is to be clicked. If no tangent can be created GRAFIS does not react.

_____
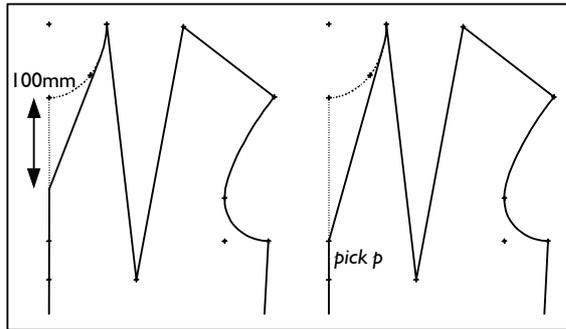
Picture 6-20

In Picture 6-20 the neckline was designed as a tangent to the neck curve. The two depicted variations differ in the starting point of the neckline on the centre front. In the left option the neckline starts at 100 mm from the neck; in the right option the neckline starts at the existing construction point.

After having called basic block 001 and having activated *p+l+c+r | tang.p=>l* the starting point of the tangent is to be determined (left: *plg on l* with *plg=100*; right: *click p*). The tangent is constructed when the neck curve is clicked. Separate the neckline with *separate | p+digi* (*click pl* at the tangent). Construct the variations shown and grade.

perp p=>l - perpendicular onto a line

Step-by-step guide:
⇒ Activate the function *perp p=>l*
⇒ Construct the starting point
⇒ Click the line onto which the perpendicular is to be dropped

With *perp p=>l* a perpendicular is dropped from a point onto a line. After having activated the function *perp p=>l* the starting point is to be determined, first. Then the line onto which the perpendicular is to be dropped must be clicked. The perpendicular takes on a right angle to the clicked line.


18 record steps
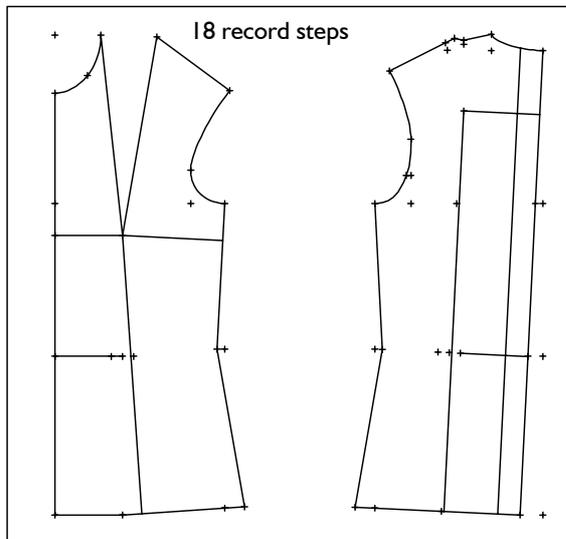
Picture 6-21

Construct the perpendiculars in basic block 001 "bodice with normal dart a. H." shown in Picture 6-21:

- the perpendicular from the bust point onto the hem
- the perpendicular from the bust point onto the centre front
- the perpendicular from the bust point onto the side seam
- the perpendicular from the waist point ft onto the centre front
- the perpendicular from the neck bk (30 mm from the CB) onto the hem
  For construction of the starting point use the point construction *plg on l*.
- the perpendicular from the shoulder dart point onto the CB
- the perpendicular from the waist point onto the CB
- the perpendicular from the shoulder dart point onto the hem

Exercises

1st Exercise

Call the basic block "bodice with normal dart a. H." and construct the following lines (Picture 6-22):

52 record steps
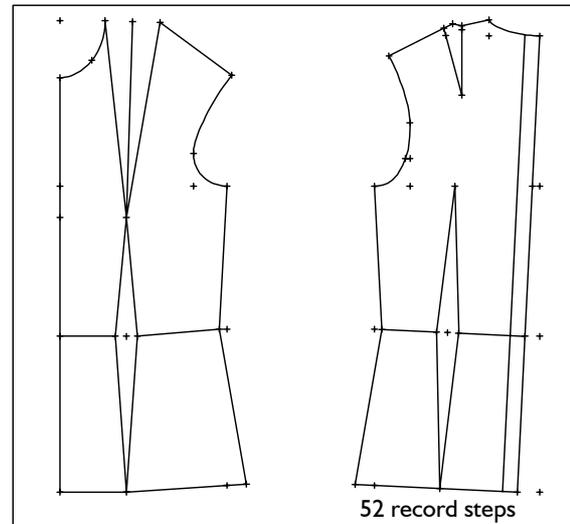
Picture 6-22

- the waist darts of ft and bk
  p==>p   activate
  Click the dart points with *click p*
- the waist lines of ft and bk
  p==>p   activate
  Click the points with *click p*
- the shoulder dart in the back
  p==>p   activate
  Click the dart points with *click p*
- the bisector of the bust dart angle in the ft
  p+l+c+r
      p+rel+p
      p==>p

_____

- a spread line to the centre back with starting and final points:
  on the neck, 20 mm from the CB
  on the hem, 20 mm from the CB
  p+l+c+r
      p==>p
          plg on l (plg=20mm) click neck
          plg on l (plg=20mm) click hem

Grade the construction in sizes 40 and 44.

2nd Exercise

Construct a skirt with pinked edge from the basic block 018 (Brue) by generating a parallel to the hem, creating point sequences on the parallel and the hem and connecting the raster points (Picture 6-23).

43 record steps
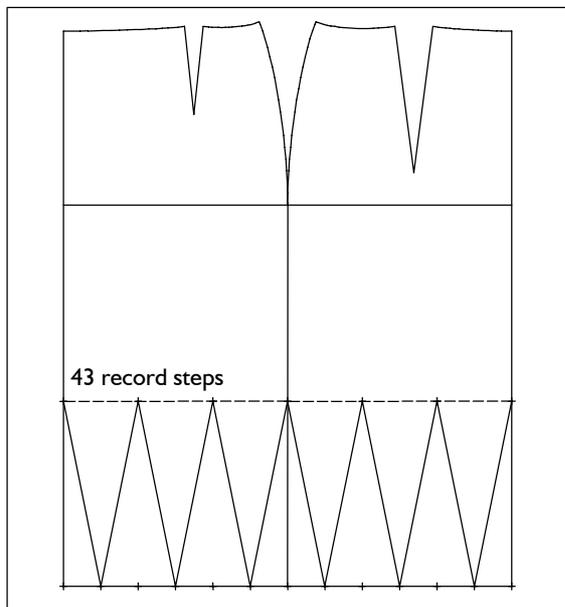
Picture 6-23

    call
    parallel   distance 200mm
    raster l   N=7
    raster l   N=7
    p+l+c+r
        p==>p

Grade the skirt in various sizes.

3rd Exercise

Construct a skirt with pinked edge as in the 2nd exercise according to your own ideas.

6.4 Direction construction and *p+dir+lg*

When is the sub-menu direction construction required ?

GRAFIS calls this sub-menu automatically when it is required for the solution of a problem, e.g.

- construction of a line to be aligned parallel to another line,
- construction of curves,
- alignment of symbols and many more.

Step-by-step guide:

⇒ Set the basic direction with the upper group of functions
- Entry of an angle in the line *dir=_____.0* or
- *click l* and clicking a line or
- *click p=>p* and constructing two points
⇒ Adjust the difference angle with the lower group of functions
- Click the star and/or
- Click + and - next to the numbers 1, 5, 15, 45, 90 in the menu

basic dir:
----
basic dir:
dir=   .0
click l
click p=>p
----
diff-angle
is: 0.
-   90   +
-   45   +
-   15   +
-    5   +
-    1   +
nil
- radius +

Star with basic direction and derived direction

An important element of the direction construction is the star. This star works like a protractor. The long point of the star gives the basic direction and corresponds to the base line of the protractor.
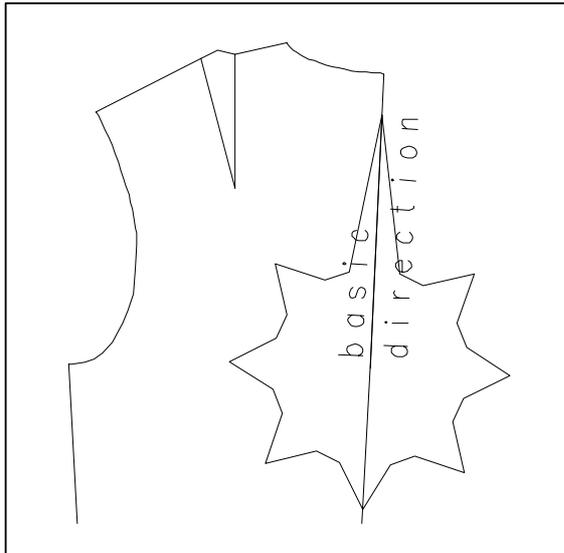

basic direction

star
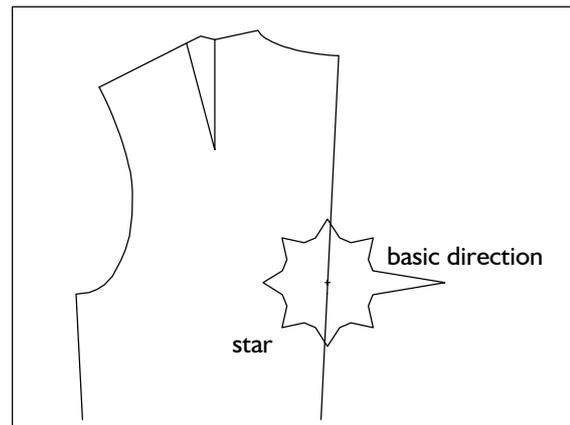
Picture 6-24

The basic direction is originally aligned in direction *dir=...* (Picture 6-24 with *dir=0.*). If the new line is to be aligned at a certain angle to the centre back for example, the basic direction is now to be aligned to the centre back.

The basic direction can be adjusted by
- clicking on *dir=...* and entering an angle,
- clicking on *click l* and clicking a line, considering the right principle or
- clicking on *click p=>p* and construction two points; the basic direction is aligned along the connection of those two points.

The long peak of the star, then, points in the direction of the current basic direction (Picture 6-25). For the example in Picture 6-25 the centre back was clicked with *click l*.

_____

Picture 6-25

After having aligned the basic direction the derived direction in which the new line is to be constructed must be adjusted. At first, the derived direction in form of a long stripe (see also Picture 6-26) points in the basic direction. It is altered by changing the difference angle between the basic direction and the derived direction. This procedure corresponds to marking an angle on the aligned protractor.
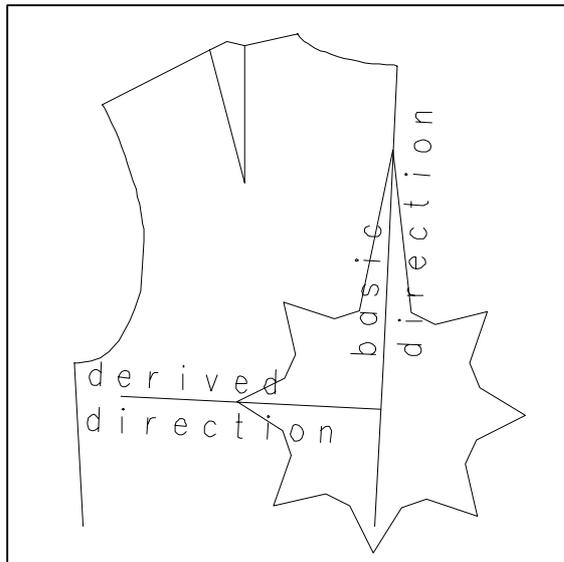
Picture 6-26

The difference angle can be adjusted
- by clicking + or - next to an angle value,
- manually, by clicking the star. For ease of use, the star is equipped with points. The inner points are arranged with a distance of 15° and the outer points at a distance of 45° to one another.

The line *is:___0.* shows the adjusted difference angle. Clicking *nil* re-aligns the derived direction along the basic direction.

Clicking + or - next to *radius* increases or decreases the star to adapt the size of the star to the screen.

The sub-menu direction construction can be quit with ⌧.

During work with the sub-menu direction construction the functions for adjustment of the basic direction and difference angle are active at all times. Thus, clicking the star close to a line can lead to re-alignment of the basic direction.

p+dir+lg - line out of point, direction and length

This line construction is also contained in the menu *p+l+c+r* and requires the direction construction explained above. The function is explained in the following.

With the function *p+dir+lg* a line with a given length is constructed from an existing point. The direction of the line can be pre-set with the sub-menu direction construction in relation to a basic direction.

| lines: |
|---|
| p ==> py |
| p + digi |
| **p+dir+lg** |
| lg=200.0 |
| tang.p=>l |
| perp.p=>l |
| rectangles: |

Step-by-step guide:
⇒ Enter length of the line in *lg=....*
⇒ Construct starting point of the line
⇒ Construct the direction of the line with the sub-menu direction construction

First, enter the length for the new line under *lg=....* (below *p+dir+lg*) and click *p+dir+lg*. GRAFIS now expects the construction of the starting point with the sub-menu point construction. The star appears with the sub-menu direction construction. Adjust the basic direction and then the difference angle. Quit the sub-menu with ⌧ and the new line appears in your construction.

Exercise on p+dir+lg
                              suggested by Prof. Helga Brückner

Call the basic block 010 "shirt blouse" and construct a horizontal yoke in the back, starting 80 mm from the neck on the centre back. Generate two points on the yoke with fixed distance. From these new points construct the style lines to the hem parallel to the CB. Then construct the cut-away in front and back and lengthen the style lines to touch the hem. The result is shown in picture 6-27.

_____

25 record
steps
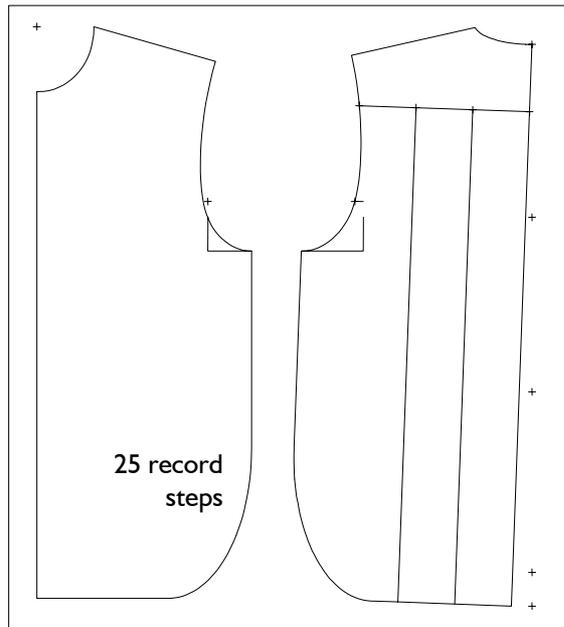
Picture 6-27

Begin with the construction of the horizontal yoke:

    p+l+c+r
        lg=150.   enter
        p+dir+lg   activate
            plg on l with plg=80.
                        click CB, **right principle!**

The star appears and you have to determine the basic direction. In this case the line is to run at a right angle to the centre back. Activate *click l* and click to the right and left of the centre back. The long point is adjusted upwards and downwards along the CB. Follow the right principle and determine the basic direction neck-->hem.

The difference angle is to be adjusted so that the derived direction points to the left. Click on the signs + or - next to the row of values for the difference angle. The long point of the star remains in its place but the derived direction changes. Click also near the star and on *nil*. After some experimenting adjust the difference angle to -90° and terminate with ◩.

Lengthen the yoke to the armhole:

    separate
        cutting line click   armhole
        cut with cuttingl.   click yoke
                                (right principle !)

Construct the starting points for the style lines.

    raster
        raster l
        N=4   click yoke

Construct the style lines as follows:

    p+l+c+r
        p+dir+lg with lg=200
            click p   starting point of the first style
                       line

The style lines are to run parallel to the CB. Activate *click l* and click the centre back. Follow the right principle and define the basic direction neck --> hem.

The derived direction is identical to the basic direction. Therefore, the difference angle remains at 0°, press ◩ and the style line appears on screen. GRAFIS will repeat these steps for each size so that the style line is always parallel to the centre back.

Construct the second style line in the same way.

Construct the cut-aways shown with

    corners
        curve
            dbc=150.   side seam
            dac=80.   hem

Lengthen the style lines to the hem.

    separate
        cutting line click   hem
        cut   style lines

6.5 Circle arcs

The *p+l+c+r* menu

In the previous paragraphs of this chapter you learned about the powerful functions for point and line construction. In the lower part of the *p+l+c+r* two options for the construction of circle arcs follow.

cp + p - circle arc out of centre point and periphery point

Step-by-step guide

⇒ Click the line *cp+p*
⇒ Construct the centre point for the circle
⇒ Construct a periphery point

Clicking *cp + p* opens the sub-menu point construction with which the centre point for the circle arc and then the periphery point can be determined. The clicked periphery point is exactly in the middle of the new circle arc.

Both options for the construction of circle arcs generate half circles only. If a complete circle is required a second circle arc is to be constructed or the circle arc is to be mirrored with the functions in the *transform* menu.


perp p=>l
circle arcs:
cp + p
cp + r
r= 50.0
rectangles:
p+w+h
w= 100.0
h= -50.0
----
reset
measure
----

cp + r - circle arc out of centre point and radius

Step-by-step guide
⇒ Enter radius for the circle in the line $r=50.0$
⇒ Construct centre point for circle
⇒ Click direction in which the circle arc is to be constructed

For this function the required radius for the circle arc is to be entered in the line $r = 50.0$ below $cp + r$ (click, type and <ENTER>). Clicking $cp + r$ opens the sub-menu point construction with which the centre point for the circle arc is to be determined. Then, GRAFIS requests the direction for the circle arc to be determined freehand. In picture 6-28 the point for the direction of the circle arc is called "click".

circle arc out of cp+p:

circle arc out of cp+r
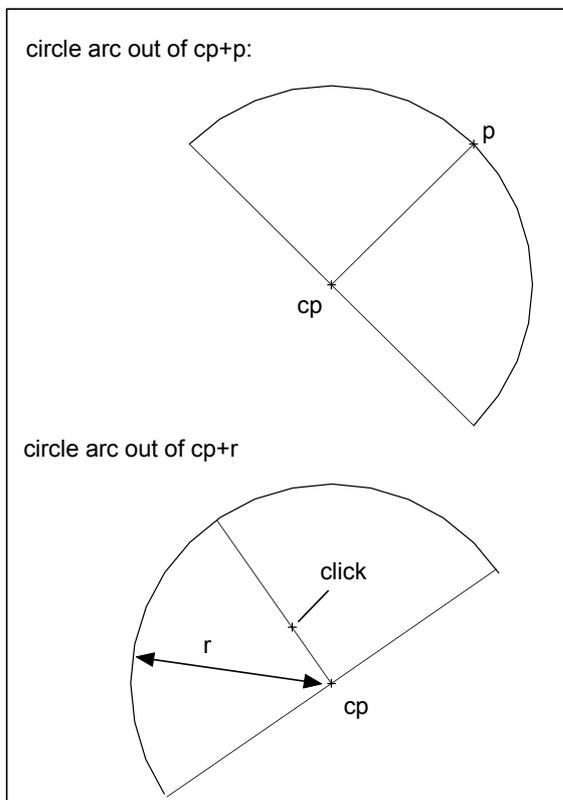
Picture 6-28

Exercise on constructing circle arcs

Call the basic block "bodice with normal dart a.H." and construct the following (Picture 6-29):
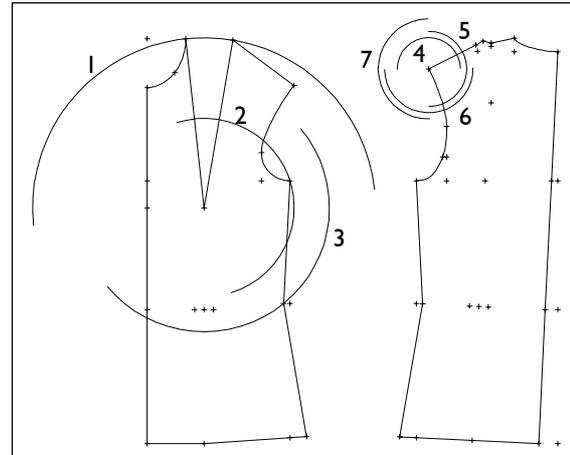
Picture 6-29

1. circle arc (1) about the bust point with final point of the dart line as periphery point
    $p+l+c+r$

cp+p	activate
click p	click bust point
click p or *click pl*	
	click final point of the left dart line

2. circle arc (2) about the bust point with intersection armhole/side seam as periphery point

cp+p	activate
click p	click bust point
intersectn	armhole and side seam

3. circle arc (3) about the bust point with side seam/waist as periphery point

cp+p	activate
click p	click bust point
click p	click waist point

4. circle arc (4) about shoulder end point with radius 50 mm

r=50.	enter
cp+r	activate
click p	click shoulder end point
click above shoulder	

5. circle arc (5) about shoulder end point with radius 60 mm
    as 4. with $r=60.0$ click to the right of the shoulder

6. circle arc (6) about shoulder end point with radius 70 mm
    as 4. with $r=70.0$ click below the shoulder

7. circle arc (7) about shoulder end point with radius 80 mm
    as 4. with $r=80.0$ click to the left of the shoulder

_____

6.6 Rectangles

The *p+l+c+r* menu
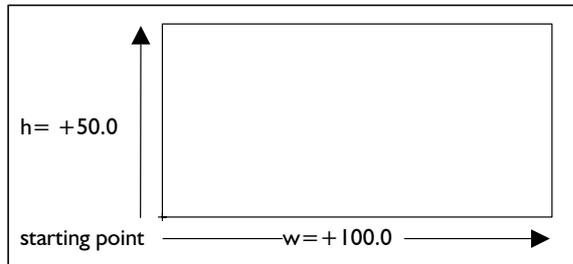Construction of rectangles in the lower part of the *p+l+c+r* menu is the conclusion of this chapter.
The function *reset* is used for resetting the last construction step of point, line, circle or rectangle construction.

p+w+h - rectangle out of width and height

Step-by-step guide
⇒ Enter the width of the rectangle in the line *w= 100.0*
⇒ Enter the height of the rectangle in the line *h=-50.0*
⇒ Click the line *p+w+h*
⇒ Construct the starting point

The width and height of the required rectangle are to be entered in the lines below the function *p+w+h*. After having activated *p+w+h* the rectangle is constructed from the starting point. w is calculated as width in x direction, h as height in y direction. If w and h are positive the rectangle is constructed upwards to the right (Picture 6-30). If both values are negative, the rectangle is constructed downwards to the left from the starting point. The signs in front of w and h can be different.

```
perp p= >l

circle arcs:
  cp + p
  cp + r
   r= 50.0

rectangles:
  p+w+h
  w =  100.0
  h = -50.0
---------------
reset
measure
---------------
```

Picture 6-30

Exercise on constructing rectangles
Call the basic block 010 "shirt blouse", delete the back and construct a patch pocket in the front. The lower left corner is to be positioned 20 mm from the centre front and 280 mm from the neck. The size of the pocket is 130 x 160 mm (Picture 6-31).

    call
    delete
    parallel   20 mm to the CF
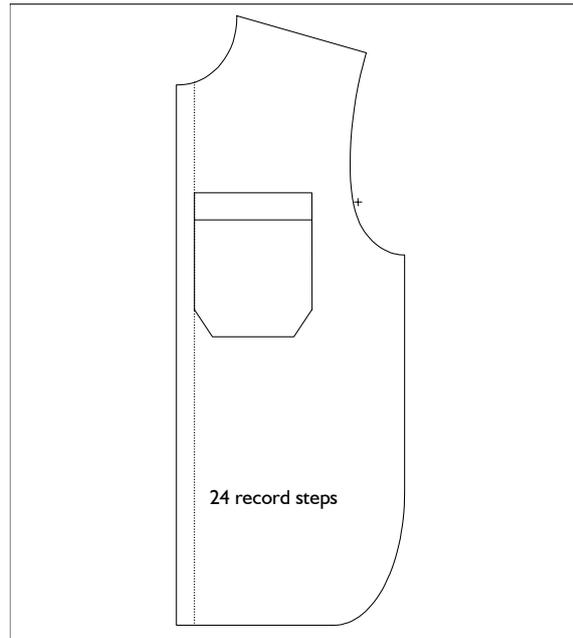
Picture 6-31

p+l+c+r	
w=+130.	enter
h=+160.	enter
p+w+h	click
plg on l with *plg=280*	click parallel
delete	auxiliary line

Shape the pocket with the functions *parallel* and *corners*

6.7 Exercises

<u>1st Exercise</u>
Construct the following square with the measurements 100x100 mm using the point and line construction functions just learned:
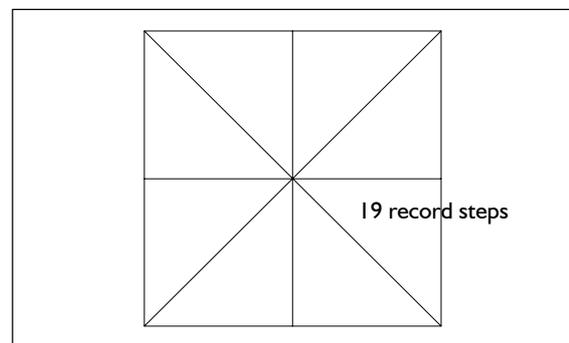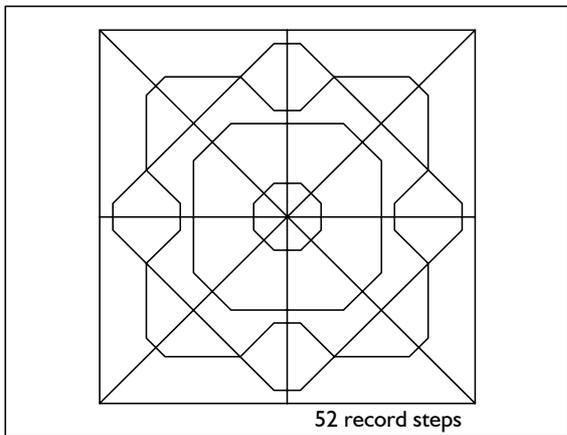
p+l+c+r
p+w+h
p==>p

_____

Continue the construction with the following aim:

32 record steps
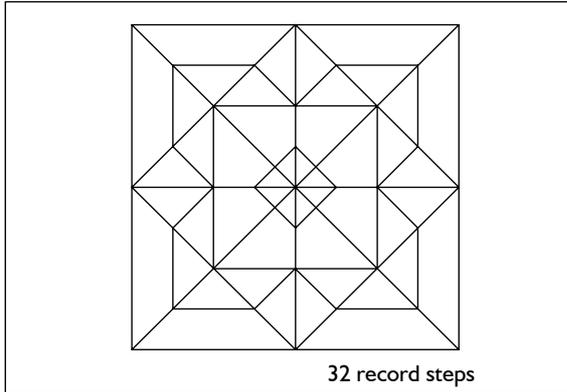
> p+l+c+r
> > p==>p
> > perp p=>l

Continue with the following aim:

52 record steps

> corners

2nd Exercise
Construct a pocket with the measurements 160x120 mm:

30 record steps
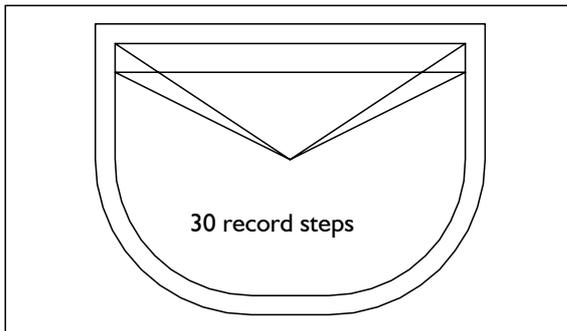
> p+l+c+r
> > p+w+h
> > p==>p
> corners
> parallel
> separate

3rd Exercise
Construct a pocket at your discretion. Examples:

32 record steps   21 record steps
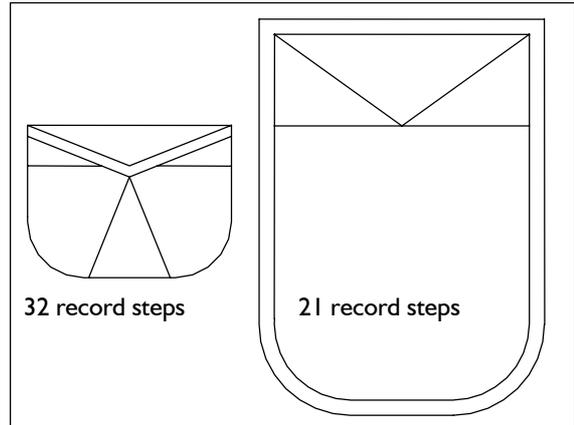
4th Exercise
In the basic block 001 construct a line with 200 mm length, starting at the centre back 100 mm from the neck. The line is to be aligned at a right angle to the centre back.

8 record steps
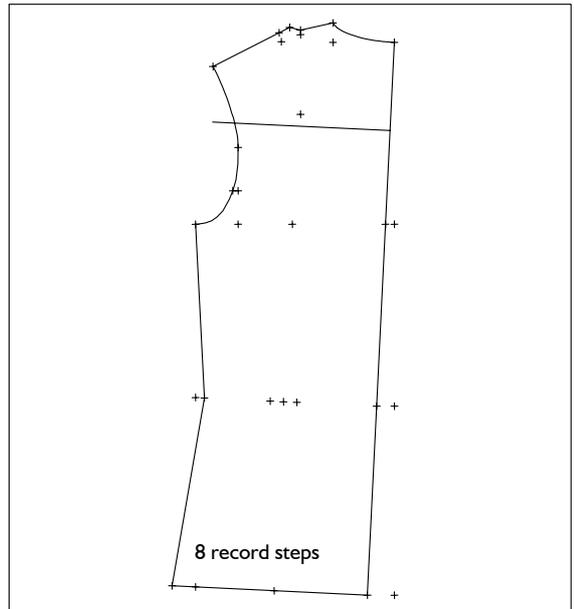
> call
> delete
> p+l+c+r
> > p+dir+lg

5th Exercise
Construct the following rosette with the measurements lg=100 mm and lg=75 mm at a distance of 15°:

74 record steps

162 record steps
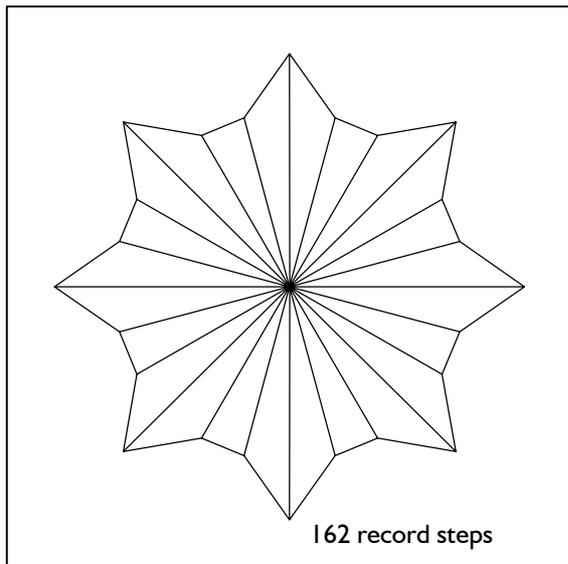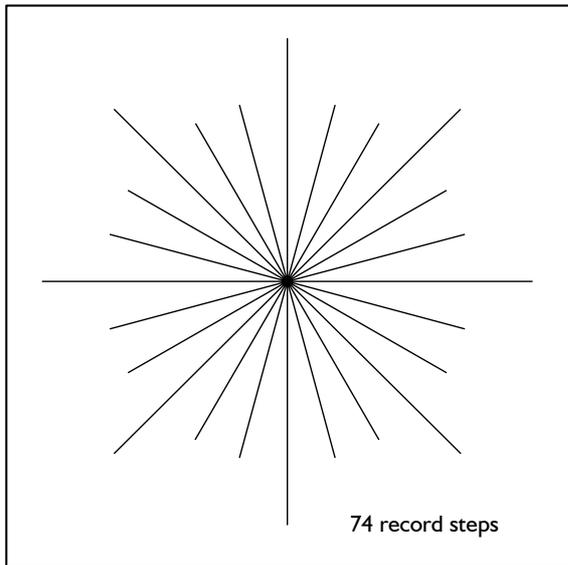
```
p+l+c+r
    p+dir+lg
    p==>p
```

Vary the construction at your discretion. A few examples can be found in the following picture.
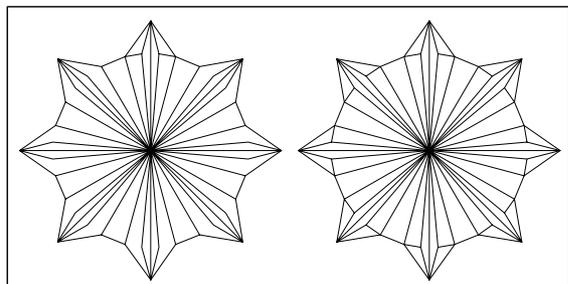
6th Exercise
In basic block 001 construct two auxiliary lines of 200 mm length starting at the bust point aligned at a right angle to the respective dart line.
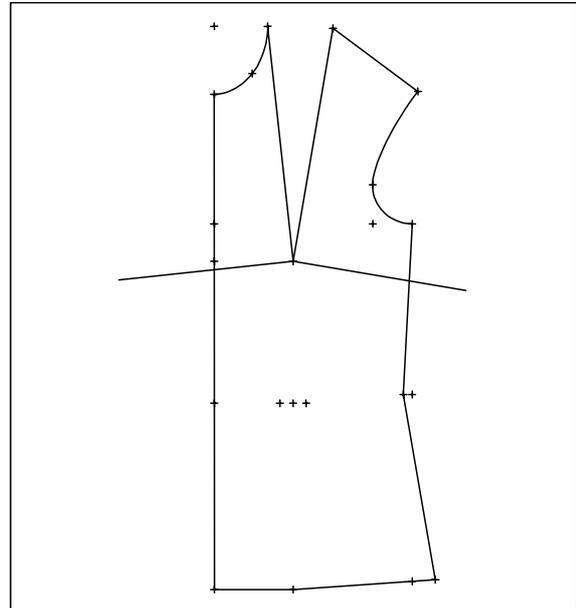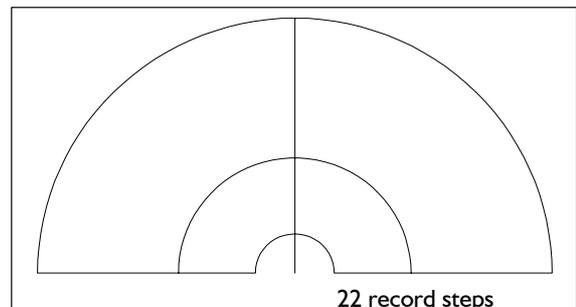
```
call
p+l+c+r
    p+dir+lg
```

7th Exercise
Construct a circular skirt with the following radius:
- hem = 726,4 mm
- hip = 328.4 mm
- waist = 111.4 mm

22 record steps

```
p+l+c+r
    p+dir+lg with lg=726.4      vertical line
    p_____
        plg on l with plg=111.4  point for waist
        plg on l with plg=328.4  point for hip
        plg on l with plg=726.4  point for hem
    cp+p
    p==>p                        close circle arcs
```

_____

8th Exercise

Construct a tight skirt from basic block 017 with inset godets, starting 200 mm from the hem. Front and back skirt are divided by three.
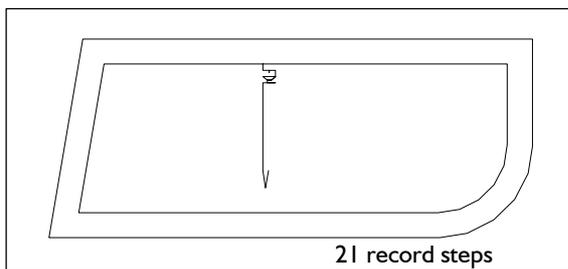
44 record steps
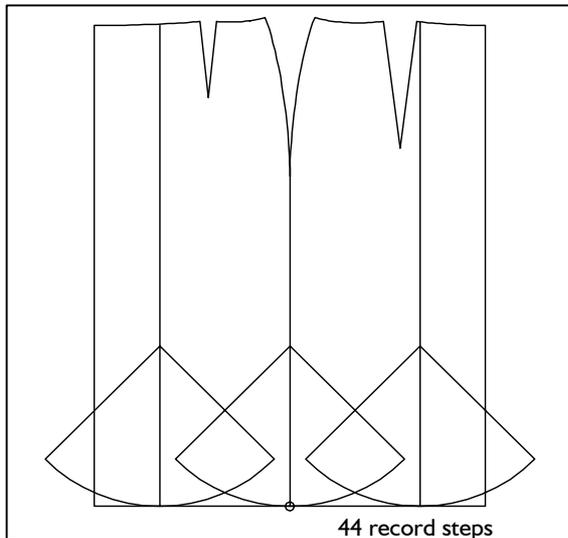
call
separate
p+l+c+r
    p==>py   auxiliary lines for godets
    cp+p   circle arcs for godets
    p+dir+lg with *lg=200.* and *45°*
                    auxiliary lines for godets
corners

9th Exercise

Construct the depicted pocket flap with the measurements
- width = 160 mm
- height = 60 mm

Lengthen one side by 10 mm and alter the other side with *corners*.

21 record steps

p+l+c+r
    p+w+h
lengthen
delete
p+l+c+r
    p==>p
corners
parallel

10th Exercise

Construct the following pocket with the measurements 160x200 mm.

18 record steps
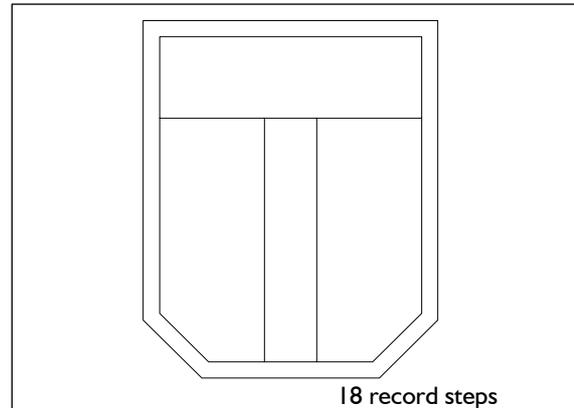
p+l+c+r
parallel
corners

11th Exercise

Construct the depicted pocket flap with the measurements 200 x 60 mm:

12 record steps
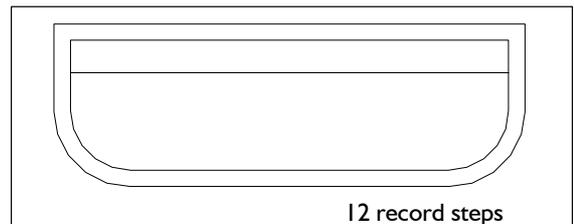
p+l+c+r
*parallel*
corners
parallel

12th Exercise

Construct the pocket flap shown from a rectangle 160x60 mm. The point of the flap is to be 20 mm long. Construct the round edges with *corners* with radius of 10 mm and 6 mm.

47 record steps
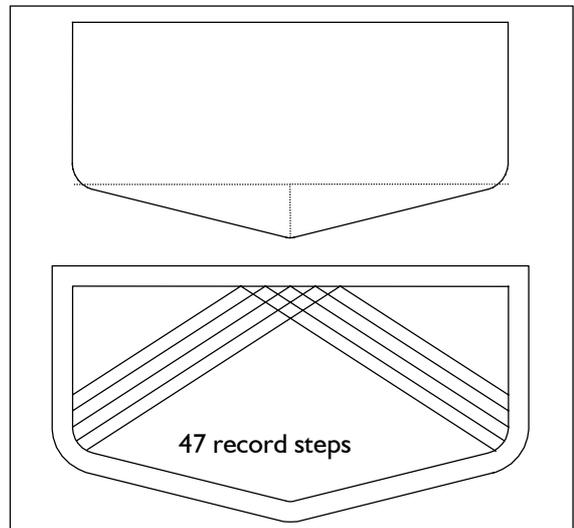
p+l+c+r   rectangle, peak
corners   round edges
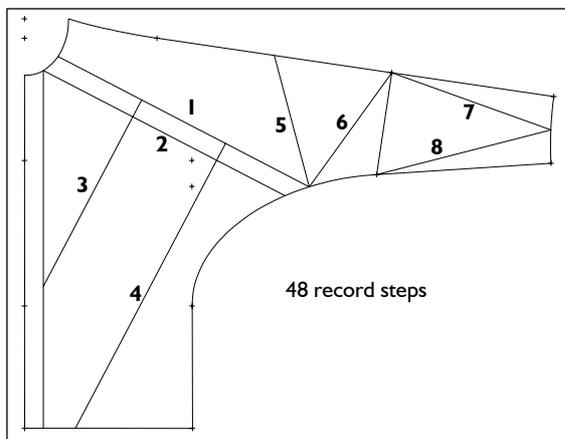p+l+c+r   line side→ 50% top edge
parallel
separate

13th Exercise

Prepare the basic block "kimono" for contrast panels !

20mm ab Halsloch
Lot
50%
17 record steps
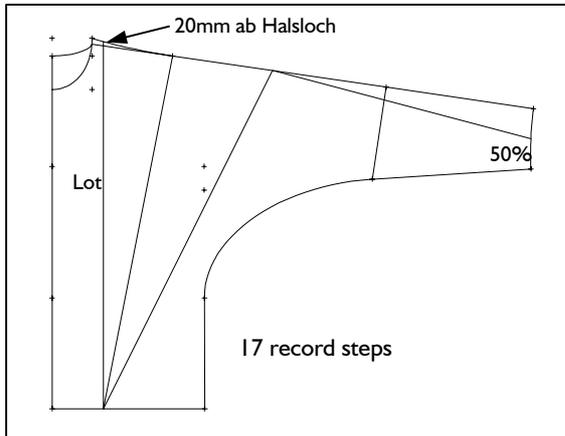
call
p+l+c+r
    perp p=>l
    p==>p

14th Exercise

Prepare the basic block "kimono" for contrast panels !



48 record steps

call
delete   back
p+l+c+r
    perp p=>l   30 mm from CF on hem
    p+dir+lg with lg=400
                   line 1: from centre of neck, right angle to neck
    p+dir+lg   line 2: from intersection perp./neck, parallel to line 1
    p+dir+lg   line 3: from 1/3 on line 1 right angle to line 1
    p+dir+lg   line 4: as line 3

separate   shoulder at elbow line
p+l+c+r
    p==>p   line 5: from shoulder (centre shoulder point/elbow line) to side seam (intersection side seam/ line 1)
    p==>p   line 6
    p==>p   line 7 (centre wrist line)
    p==>p   line 8

15th Exercise

In the basic block "skirt after Hohenstein" construct the depicted lines for yokes and panels at the side seam.


75mm
25%   25%
100mm
19 record steps
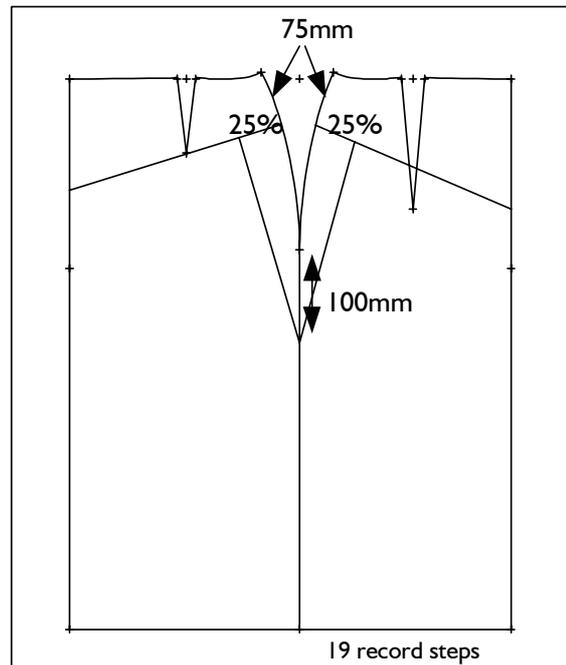
call
p+l+c+r
    p+dir+lg with lg=200
        plg on l with plg=75.   line from side seam starting 75 mm from waist, right angle to side seam at the starting point
    p==>p   line starting at side seam 100 mm from hip point, ending at 25% of the yoke

16th Exercise

From the basic block 017 (bk) construct a skirt with separate godet and hidden zip in the centre back. Set the symbols after completion of chapter 7.
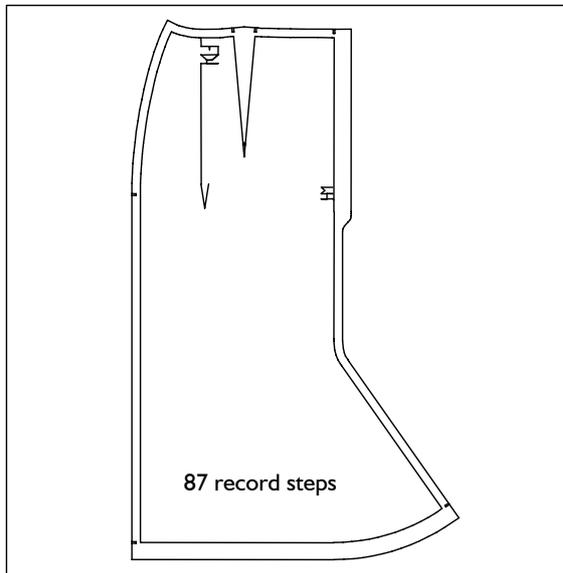   call
    delete   skirt front
    p+l+c+r
        circle arc
        p+dir+lg
    separate
    parallel   seam allowance for zip

_____

90 record steps
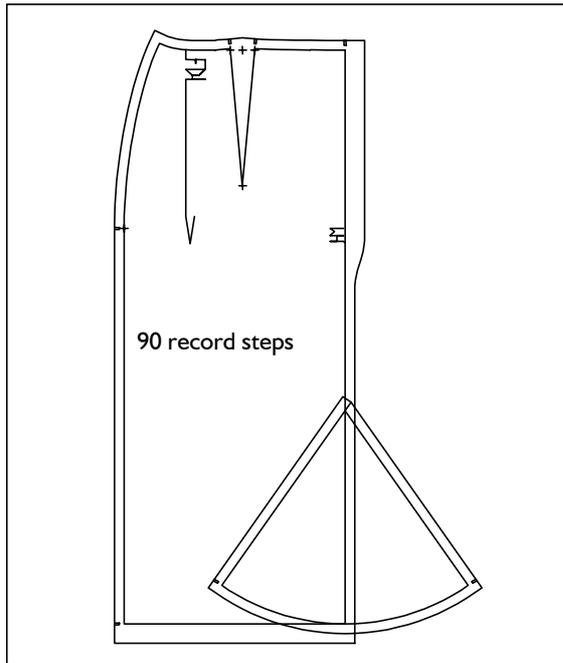
delete   dart
corners   waist
link
    link with curve   zip
symbols   after chapter 7

17th Exercise

From basic block 017 (bk) construct a skirt with grown on godet and hidden zip in the centre back. Set the symbols after completion of chapter 7.

87 record steps

The steps are the same as in the previous exercise.

18th Exercise

Call basic block 001, delete the back and construct the waist lines and the upper inside dart. Then, shorten the dart by 30 mm.

36 record steps
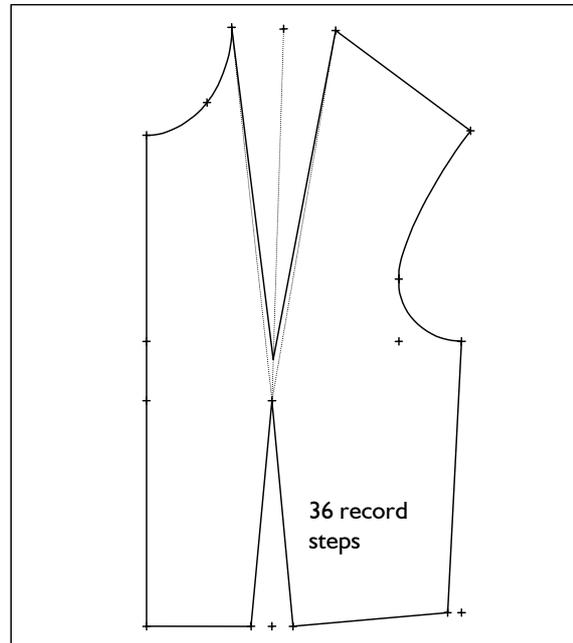
call
delete   back
p+l+c+r
    p+rel+p with rel=50.
    p==>p   bisector of angle
    p==>p with plg on l and plg=30.
                  new dart lines
    p==>p   waist lines
delete