Schematics
by Donna Estin

Special Topics in Design Spring 2022

Knitters love good schematics! Whether your design has been commissioned by a publisher or will be self-published, including a well-planned, accurate schematic is important. Schematics allow knitters to block pieces to proper measurements and to make length decisions while knitting. They help designers visualize the garment size and shape during the design process, which allows designers to make changes in the early stages if needed.

What Are Schematics Exactly?

A schematic is an accurate, to-scale drawing of the pieces of the knitwear as they are drying. They are used any time you have anything other than a knitted square or rectangle. Even a triangle shawl benefits from a schematic to place the measurements for each side.

Do I Draw the Whole Sweater or Pieces of the Sweater?

The shape of the schematic should look like each piece as it's being blocked. If you are designing a seamless garment, the drawing will resemble the finished garment as shown in Figure 1 below. If your design is knitted flat and seamed, then your schematic will include a drawing for each piece. In the drawing on the right, it shows the back/front and one sleeve. You'll notice here that even though the back and front are worked separately, to save space you can overlap them and show the different necklines for the back and front.

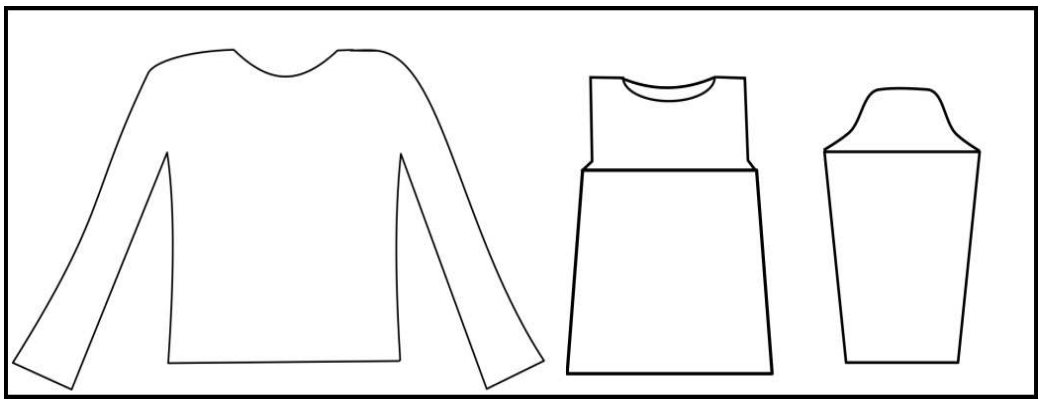

Figure 1

Below is an example of two cardigans. The first one (Fig. 2) is worked in one piece to the armholes, then divided. It shows the body of the cardigan as one piece, the set-in sleeve as a separate piece, and looks the way it will appear when pinned out on blocking mats.

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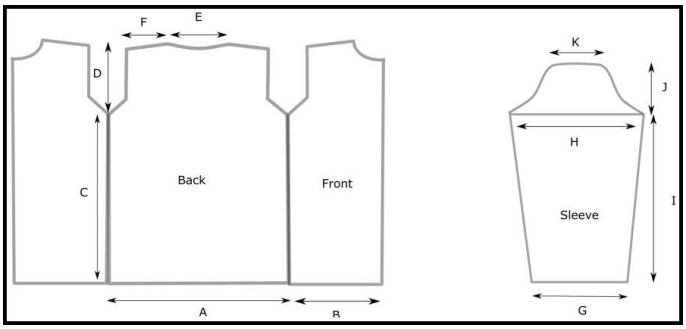

Figure 2

Figure 3 below shows the same cardigan, worked in separate pieces and seamed.

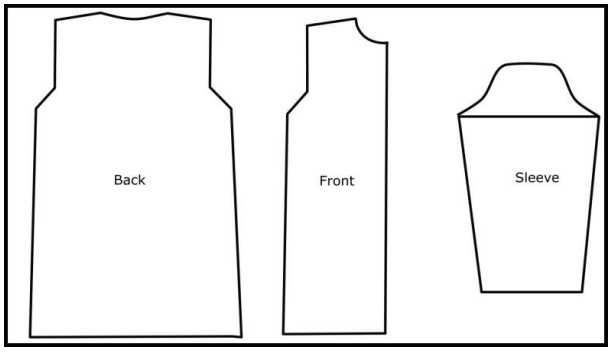

Figure 3

You can also draw the cardigan with the fronts overlapping the back, which saves space (Fig. 4). Notice the gap in the center of the cardigan. The schematic should be drawn as the pieces look when they are drying. If your pieces will be blocked before picking up stitches for button bands, then leave the bands out of your schematic. The measurement for B will be the front width without the button band. If your button bands are worked at the same time as the garment, then the front measurement will include the band.

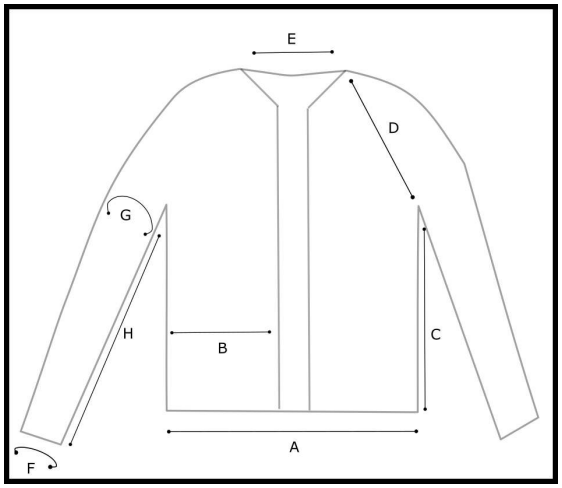

Figure 4

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How to Draw Schematics

Any vector graphic software can be used to create schematics on your computer. Some of the best ones are CorelDraw, Adobe Illustrator, Gravit, and Inkscape, which is what I use (it's free and is a powerhouse of a program). There is a learning curve with any of these programs. This is not an area where you can sit down at your computer and whip out a good schematic on your first try. If you are a designer, this is a skill that you will want to master, and that takes practicing on the program you choose. Schematics can be drawn in Paint or Excel, but these are limited. Regardless of the program you choose, the details of what goes into a schematic are the same, so let's take a look.

Drawing to Scale

Each schematic should be drawn to scale. This means that each part of the drawing—the sleeve length, neck width, chest circumference, etc.—is the same proportion in relation to the finished garment. The drawing needs to be a scaled-down version of the finished garment.

To do this, when you are in your graphic design program, select the grid option if it's not already present. This is the same as drawing on graph paper. Designate one square as one inch, or if you're designing in metric, as two centimeters.

If the back of the sweater measures 18" across, count over 18 squares when drawing the outline. If the length from underarm to bottom edge is 16", count 16 squares from the bottom to the armhole shaping. If the armhole is 7", count up 7 squares from bottom of the underarm to the shoulder where it meets the sleeve. Draw each part of the schematic to the same measurement as the garment.

Which Size?

You'll create only one schematic for publication. If you've designed a garment in nine sizes, there will be quite a difference in the look of the smallest and largest sized schematics. However, you aren't trying to show what each particular size will look like. You are providing one drawing with all of the measurements for every size. There are three options for deciding on which size to draw your schematic: a) the smallest size (this saves space for print publications), b) the average of all sizes, or c) the same as the sample (this will match the picture shown on the cover of your pattern). A and C are by far the most used. If you have space, or are publishing digitally, create your schematic based on the sample size shown in the photos.

Which Measuring System?

If you are writing your pattern in both inches and centimeters, you'll need to carry both units of measurement throughout the entire pattern, including on the schematic.

Where To Put Measurements?

Before we were designers, we were knitters, and it's always helpful to remember that throughout your design career. The purpose of the *published* schematic is for the knitter's benefit. I say *published* because there is another version of schematic that I refer to as the *working* schematic, which is purely

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for the designer's benefit. From a knitter's perspective, it's oftentimes easier to read measurements that are placed directly on the schematic. They're easier to see and are right where knitters want them. If you want to know the waist measurement, look at the waist, and you have your measurement. This option is better if you're working with only a few sizes and in either imperial or metric, but not both (see Fig. 5). Remember the goal is to make this easy to reference for knitters.

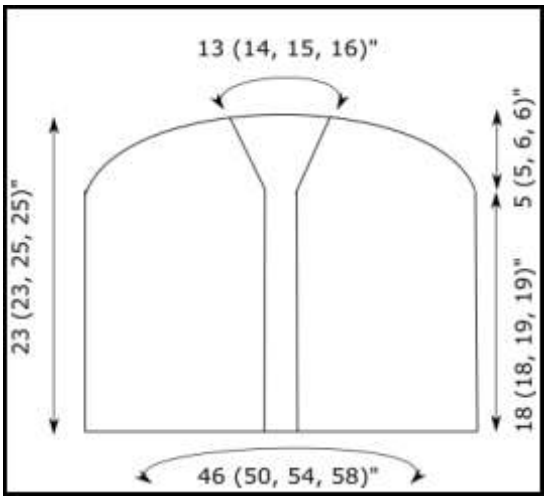

Figure 5

However, when you have a wide range of sizes, in both imperial and metric, with multiple measurements like hip, waist, bust, and cross-back on the body, the schematic can become messy and difficult to read (see Fig. 6).

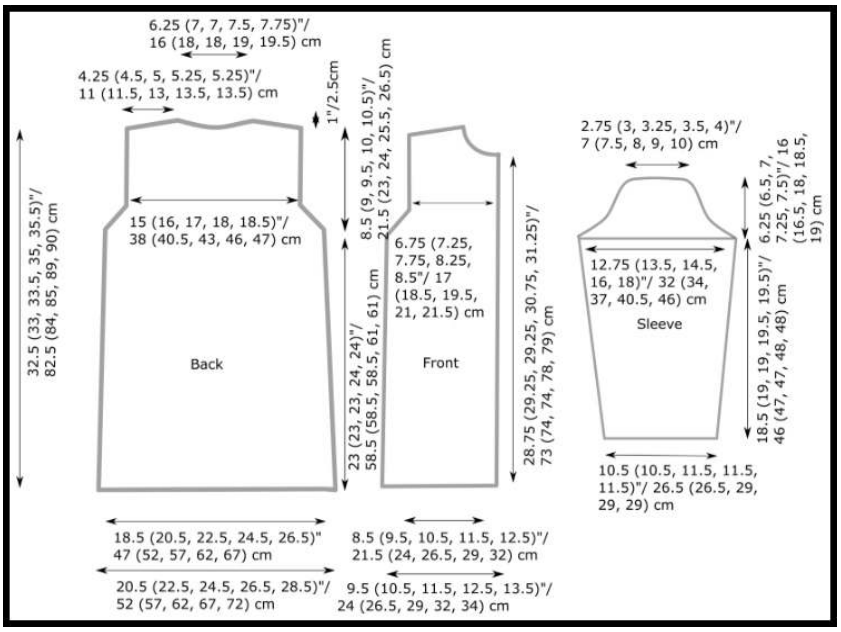

Figure 6

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The above schematic is a mess in many ways, and it's for only five sizes. Can you imagine how cluttered this would be with nine sizes? To keep it cleaner, draw your schematic, then place measurements at the bottom or side (see Fig. 7 and Fig. 8). For an example, see the Sconset pattern in this issue.

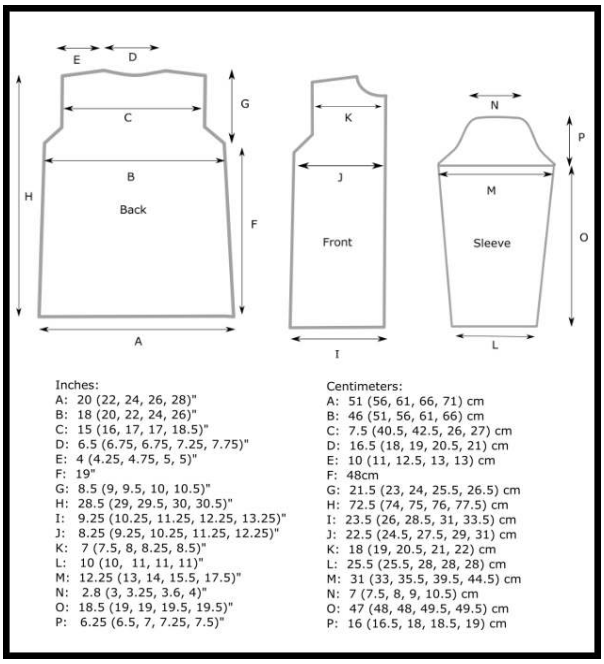

Figure 7

The schematic looks much cleaner even though knitters now need to take two steps to find the measurement: (1) they look to the drawing and find the letter, and then (2) they look at the bottom/side to find the letter and get the measurement. This also allows you to place inches and centimeters in separate listings to keep it easy to view. This is the better option when you have a lot of measurements, a lot of sizes, and are using both imperial and metric. Another plus is that if you've designed a second garment with the same shape, you can re-use the schematic and just plug in the new measurements at the bottom or side.

You can use either option. You'll see both. It's your choice (or the publisher's choice), and it depends on what you're designing, how many sizes, where it's being published, and in which measuring unit.

Which Stitch Count Goes into the Schematic?

If you're working in the round, you do not have selvedge stitches, so the finished circumference matches the schematic measurements. But if a piece is worked flat, the measurements include selvedge stitches. Think of the schematic as the exact size that each piece will be when it's wet blocked and pinned in place. If a sweater is worked flat, and the back measures 16" across, if we didn't include selvedge stitches and you pinned this to 16", with a stitch gauge of 4 stitches to one inch, the top, once seamed, would be closer to 15.5" or 31" in circumference instead of 32". Once you add one selvedge stitch on each side, the measurement of the back width is now 16.5".

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Remember that the final measurements of garments are based on the stitch counts, not what you originally intended. If we always worked in stockinette, these numbers would mostly be the same, but since we work in different stitch patterns with various multiples, and we round our numbers up or down to be consistent, our stitch counts often produce a different measurement than what we planned. Before plugging measurements into your schematic, return to your grading spreadsheet, convert the stitch counts of each body part to inches/centimeters based on your stitch gauge for that section. This is the measurement you'll use in the pattern and schematic.

Which Measurements Should Be Shown on the Schematic?

For publishable sweater schematics, include the body width if worked flat (circumference if worked in the round), cross back, back neck width if worked flat (or neck circumference if worked in the round), shoulder width, length from underarm to bottom edge, armhole length, overall length (which includes shoulder shaping if used), cuff width or circumference, upper arm width or circumference, and sleeve length. If you're designing a circular yoke sweater, instead of the cross-back measurement, you'll list the yoke circumference where the sleeves and body join.

Optional measurements include the front neck drop and shoulder drop. Include waist and hip width or circumference only if they differ from the chest measurement.

For socks, include the cuff circumference, length of sole, and height of sock. For hats, include the brim circumference, brim height (if there is one), hat height, and diameter of widest part. For a beanie, you'll have one circumference; but for a tam or beret, where the brim is tighter and the fullest part spreads out, you'll want to list both. For shawls or scarves, list the width and length, and for triangular or more complex shapes, make sure you list measurements at each line.

If you create a working schematic for yourself—which is very helpful during the design stage—you can put everything in there. This is helpful as you're designing to know exactly how wide or long a section should be. It allows you to visualize how deep your waist will be before and after shaping, or how long you want your cuffs to be before shaping sleeves, or to see how much distance you're allowing between the underarm and fullest part of the bust when shaping.

Styling Your Drawing

I've talked a lot about how to make the schematic accurate, both in the measurements that we've included and the numbers themselves, and how to draw the schematic to scale. But you can take your schematic a step further by adding in some styling features. For the ends of lines, you can use arrows, dots, diamonds, or any other creative end marker. Use straight lines when a section will be knitted flat and curved lines when it will be knitted in the round. In Figure 8, the sweater is worked in the round from the bottom up, divided at the armholes, then each front and back are worked flat and joined with three-needle bind off at the shoulders.

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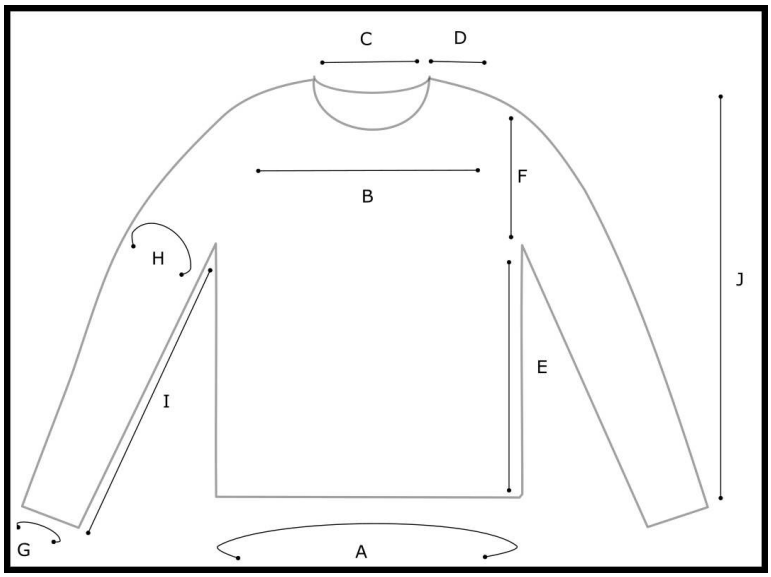

Figure 8

Make sure the thickness of each line/arrow is uniform, and that they're visible and easy to read. If you wish to use shading or change the opacity of the drawing, go for it! But keep in mind that schematics will be viewed on computers, tablets, phones, and printed in color and in black and white. Your goal, as the designer, is to create something that is large enough to read and easy to see across all of these. If you're submitting a schematic as part of your design to a publisher, know that the publisher may change your schematic to ensure uniformity with the formatting of their style guide. Look at the schematics published in magazines or books by that publisher to see if there is a common theme. Are they using dots at the end of each line instead of arrows? By creating an accurate schematic that closely resembles their preferences and by sending in your best work, you'll make a good impression. And good impressions are like little gold stars next to your name when they review your next submission.

Getting Ready for Publication

Are you in love with what's on your screen? Great! Now it's time to get this image ready to publish. Save as an .SVG (Scalable Vector Graphic) or the format that your program uses. SVG defines vector-based graphics for the web in XML format, and every element and attribute can be animated. This allows you to enlarge the graphic and retain its crispness and clarity. The grids that you see when creating a schematic disappear once exported. You can usually choose to export just the drawing, or the page, or just a selection, which allows you to export just the drawing without extra space. But if you end up with white space after exporting, which is very common, crop it out before sending in your files or importing into your pattern. Now you're ready to insert this image into your pattern, whether it's Word or a publishing software if you are self-publishing. If your design is commissioned by a publisher, all schematics (body, sleeve, etc.) should be in one file, but check the style guide sent by the editor since each publication has its own preference for receiving files.

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It Gets Easier Every Time

Once you create a few schematics that you're happy with, you can return to these and use them as templates. "Save As" to your new file and make modifications. This prevents you from starting from scratch every time. Do make sure your drawing is to scale every time. Count your squares and adjust the size if needed. Add or subtract waist shaping, alter the neck size, make the sleeves narrower or wider. It's easier to modify an existing schematic than to start with a blank screen. I hope you love playing around with schematics as much as I do. If you're a designer, make this a goal this year, and you'll be so glad you did. By taking time now to work on your schematics, you'll save time with future designs as you improve and develop your own style.

For a beginner's guide to Inkscape, watch Joeli's video tutorial on How to Create Schematics in Inkscape.

Links to some vector graphics software options:

Inkscape	https://inkscape.org/
CorelDraw	https://www.coreldraw.com/en/
Adobe Illustrator	https://www.adobe.com/products/illustrator.html
Gravit	https://designer.gravit.io/

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