Chapter 14

WORKING A PATTERN REPEAT

In part one, the swatches and projects were small, and their charts showed every stitch (or other knitting operation) on every row. The projects would make good coasters, hot pads, or dish scrubbers, depending on the yarn used.

If we want to make a large item, like a sweater or blanket, with a pattern that gets repeated many times, then we need to understand how to work from charts with *pattern repeats*.

The vast majority of instructions and charts follows the unwritten assumption that we're all traditional knitters, working public-side rows from right to left. This chapter will make the same assumption.

We'll use a chart with the small version of the purl diamond motif.[1]

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                                          9
 8    ┌──────────┬─────┬─────┬──────┐
      │          │     │  •  │      │     7
 6    │          │  •  │     │  •   │
      │          │     │     │      │     5
 4    │       •  │     │     │   •  │
      │          │  •  │     │  •   │     3
 2    │          │     │  •  │      │
                                          1
      I H G F E D C B A
```

The thick lines are the *pattern repeat* boundaries. The thick vertical line between stitches H and I shows the boundary of the *stitch repeat*. The thick horizontal line between rows eight and nine shows the boundary of the *row repeat*.

What do these terms mean? How do we interpret the chart?

For the purposes of the following discussion, we will assume that our project has forty-one stitches and doesn't have any borders.

The Stitch Repeat

To work from the chart, we would read and work stitches A through H from right to left since row one is a public-side row.

The stitch repeat boundary after stitch H directs us to go back to the beginning of the row and work stitches A through H a second time, when we again come to the stitch repeat boundary. We keep working stitches A through H in the same way across the piece until we

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[1] We'll see in a later chapter how to create such a chart.

have only one stitch left. We should have worked stitches A through H five times, using up forty of the forty-one stitches.

The Plus Stitch

When we have only one stitch left on the source needle, we work stitch I, the **plus stitch**, which is outside the stitch repeat boundary.

Let's pop up to row five for a moment, so we can see something that isn't obvious on row one. Imagine we have worked row five all the way across until we have only one stitch left. At that point, we work stitch I. Since we started row five with a knit stitch **before** the right point of the **first** motif, the plus stitch I gives us a knit stitch **after** the left point of the **last** motif.

In other words, the plus stitch usually mirror-images how the pattern began, so that the left edge looks the same as the right edge.[2]

Private-Side Rows

When we finish pattern row one, we go on to pattern row two. We work it exactly the same way that we worked row one.

Are you thinking, *Wait! Row two is a private-side row! What do I do?*

Since on a private-side row we either turn the chart upside-down or read the chart from left to right, the first stitch we work will be the plus stitch, stitch I. Then we work stitches H through A. When we have worked stitch A the first time, we go back to the first stitch inside the stitch repeat boundary, stitch H, and work stitches H through A a second, third, fourth, and fifth time.

When we finish the fifth set of stitches H through A, we should have worked all forty-one project stitches. If we don't have eight stitches left when we begin the last set of stitches H through A, we have made a mistake somewhere along the way.
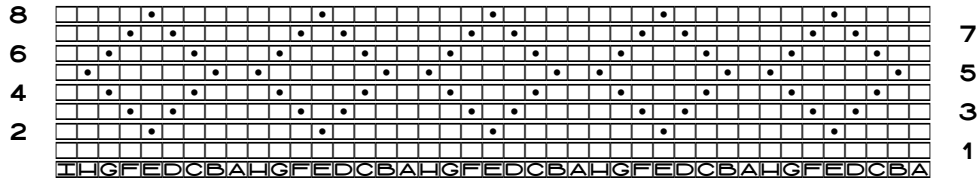
After We Complete the First Eight Rows

We work rows one through eight this same way, flipping the chart at the end of every row (or reading left to right on the private-side rows while leaving the chart the right-side up all the time).

What we'll have actually worked so far is this equivalent chart:

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[2] For asymmetrical stitch patterns, there will probably be several plus stitches that will finish the left-most motif neatly.
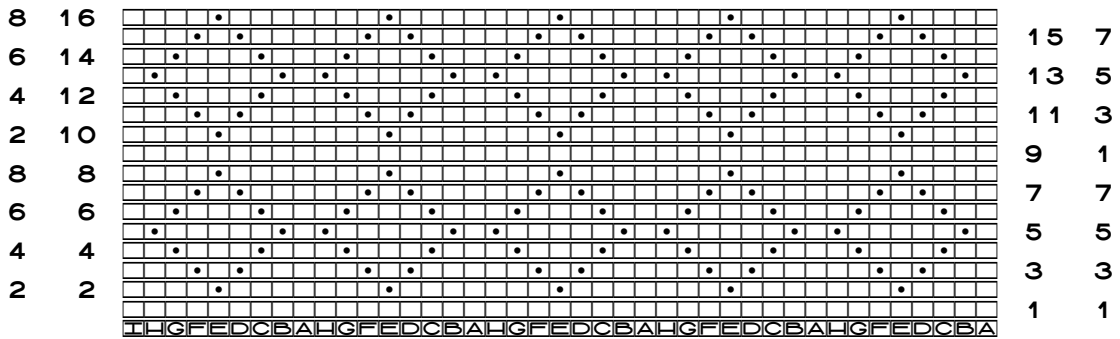
8 [chart row 8] [chart row 7] **7**
6 [chart row 6] [chart row 5] **5**
4 [chart row 4] [chart row 3] **3**
2 [chart row 2] [chart row 1] **1**
IHGFEDCBAHGFEDCBAHGFEDCBAHGFEDCBAHGFEDCBA

On each row, we've worked stitches A through H five times, and we've worked the plus stitch, stitch I, only once.

The Row Repeat

When we finish row eight, we see it has a thick line above it. Just as the thick **vertical** line showed the end of the **stitch** repeat, the thick **horizontal** line means we've reached the end of the **row** repeat.

So we start back over again with row one.

When we've worked the row repeat twice, we'll have worked this equivalent chart:

8 16 [chart rows] **15 7**
6 14 **13 5**
4 12 **11 3**
2 10 **9 1**
8   8 **7 7**
6   6 **5 5**
4   4 **3 3**
2   2 **1 1**
IHGFEDCBAHGFEDCBAHGFEDCBAHGFEDCBAHGFEDCBA

The outer two columns contain the stitch pattern's row numbers, while the inner two columns are the project's row numbers.

When we complete pattern rows one through eight for the second time, we once again go back and start with pattern row one. We would work as many sets of rows one through eight as needed.

The Plus Row

You might be able to guess what we do now. Since we repeated pattern rows one through eight as many times as necessary, we work pattern row nine just once to finish up the pattern, then bind off.

In the same way that the plus stitch balanced out each row, to make the right and left

edges mirror-image (or to finish neatly an asymmetrical motif), the plus row balances out the pattern vertically, making the last row of the entire piece mirror-image the very first row (or finishing the stitch pattern neatly if it isn't symmetrical).

Since there is a row of knit stitches **below** the **first** row of diamonds, row nine puts a row of knit stitches **above** the **last** row of diamonds.

The Plus Row Usually Has the Same Stitch Repeat

Even though the pattern chart's plus row, row nine, doesn't actually show the stitch repeat boundary between stitches H and I, we do need to work the same stitch repeat (stitches A through H) all across the plus row.

If charts don't show the stitch repeat in the plus row, we simply must remember to extend the stitch repeat into the row repeat on our own.

Stitch Repeat, Row Repeat, or Pattern Repeat?

Sometimes project instructions will use the generic term *pattern repeat* instead of either of the more explicit terms *stitch repeat* and *row repeat*.

Usually it's clear from the context exactly which of the two specific repeats the instructions are referring to. In other cases, *pattern repeat* will mean the combination of the stitch and row repeats.

Advantage of Charting Only the Pattern Repeat

One obvious advantage of charting only the pattern repeat is that the chart symbols can be a lot bigger! Compare the symbol sizes in the two equivalent charts with the one that shows only the pattern repeat.

Review for This Motif

There are a few key points to take away from working this first pattern repeat chart.

Work the Stitch Repeat Over and Over Across the Row

Each time we finish working the stitch repeat on public-side rows, we go back to the beginning of the row and again work through to the stitch repeat boundary. We keep working those same pattern stitches until we don't have enough stitches left on our source needle to do another repeat. At that point, we work the plus stitch.

On private-side rows, we first work the plus stitch, then work the stitch repeat across the rest of the row.

Work the Plus Stitch Only Once per Row

The stitch outside the stitch repeat boundary is the plus stitch, which gets worked only one time on each row. Whether the plus stitch is at the beginning or end of the row depends on whether we're working a public- or private-side row.

Work the Row Repeat Over and Over

The row repeat gives the project its length (or height). We work the row repeat as many times as necessary.

Work the Plus Row Only Once

When we have worked as many row repeats as directed or desired, we work the plus row to finish off the pattern the same way it started. We usually have to work in the plus row the same stitch repeat as in the row repeat, even if it's not explicitly marked in the chart.

## Use Stitch Markers Between Pattern Repeats

The stitch markers will let us know by the end of each repeat if we have made a mistake. For this pattern, we would have a stitch marker every eight stitches (counting from the first stitch on a public-side row), and there would be just one stitch after the last stitch marker. We could also omit the stitch marker before the plus stitch, so we'd have nine stitches, the eight from the final stitch repeat and the single plus stitch, after the last marker.

For this pattern, stitch markers are, of course, unnecessary. But the technique is the same for complicated patterns where markers do all the counting for us.

There are, however, patterns that we might call "marker-unfriendly." Near the end of the chapter, we'll look at ideas for working such patterns.

A Variation on the Chart

Plus stitches and rows don't always come after the pattern repeat. We can have plus stitches and/or rows **before** the pattern repeat. Suppose the purl diamond chart was drawn this way:
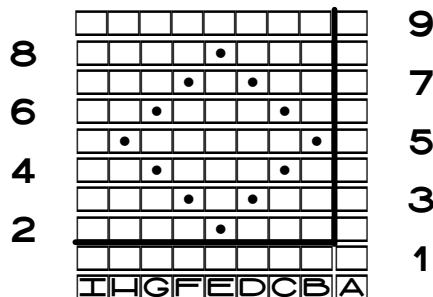
How would we interpret this version?

The Stitch Repeat

Let's start the discussion with row three, which is the first public-side row within the stitch repeat, still assuming we have cast on forty-one stitches.

The plus stitch on each row is stitch A. So on public-side rows three, five, seven, and nine, we would work stitch A, then we would work stitches B through I repeatedly across the remaining stitches.

For the private-side rows, we would work stitches I through B all the way across the project, then on the final stitch, we would work the plus stitch A.

Even with the plus stitch at the beginning of the public-side rows, the project as worked has a knit stitch both before the first diamond and after the last diamond.

The Row Repeat

The plus row is row one. We would work row one once, interpreting stitch A as the plus stitch (since it's outside the confines of the stitch repeat on rows two through nine, even though there's not an explicit stitch repeat boundary on row one), then we would work rows two through nine.

When we complete row nine, we go back to row two, the first row inside the row repeat boundary, and work rows two through nine again. We work rows two through nine as often as needed, then bind off.

Note that we still have mirror-image plain knit rows both below the first row of diamonds and above the last row of diamonds.

All Four Variations

Since the chart could show the plus stitch before or after the stitch repeat, and it could also

show the plus row before or after the row repeat, there are actually four combinations, resulting in four different charts.

Plus Stitch After Stitch Repeat

Chart one is the chart at the beginning of the chapter. The stitch repeat is worked over and over, then we work the plus stitch just once. We work rows one through eight over and over, then we finish by working row nine one time.

In chart two, the stitch repeat is still stitches A through H, and the plus stitch is still stitch I. But the plus row is before the row repeat. So we work row one just once (using the implied stitch repeat all the way across), then we work rows two through nine over and over as the row repeat.
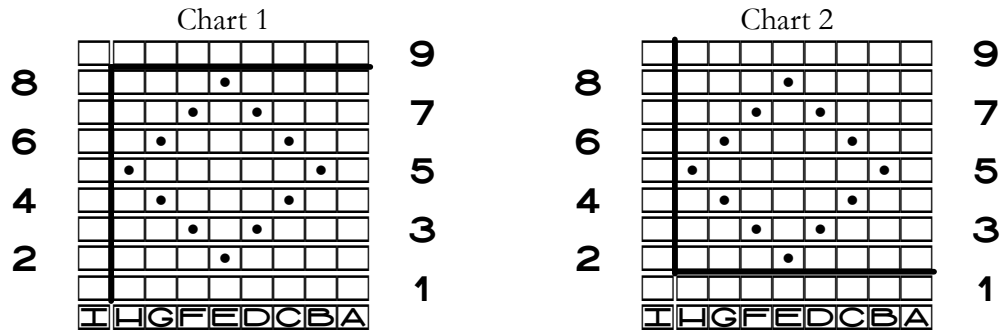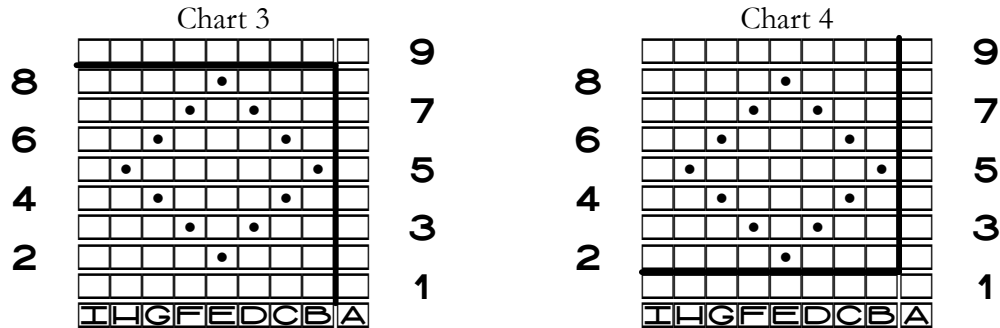

Chart 1

Chart 2

Plus Stitch Before Stitch Repeat

In charts three and four, the plus stitch is stitch A. So stitch A is worked only once per row, and stitches B through I are worked over and over across the piece.

In chart three, the row repeat is rows one through eight, and row nine is the plus row.

In chart four, the plus row is row one, worked just once at the very beginning, including the implied stitch repeat, and the row repeat is rows two through nine.

Chart 3

Chart 4

Four Different Charts Give the Same Result

If we worked up a project from each of these charts, the four projects would be identical (as long as we used the same number of stitches and rows, of course).

Most Charts Are Clear

In all four versions of the chart, regardless of where the plus stitch and plus row are, it's clear which part of each chart forms the pattern repeat, both horizontally across the stitches and vertically up the rows.

In general, most charts will be similarly clear about which part of the chart shows the pattern repeat itself and which parts form the plus stitch(es) and plus row(s).

The stitch repeat is usually the bulk of the stitches width-wise, while the plus stitch(es) are often fewer in number. The row repeat is likewise usually the bulk of the chart's rows, while the plus row(s) generally amount to just a few rows.

If we can't tell which part of the chart is the repeat and which part is the plus stitches and/or rows, then comparing the chart with the photograph, assuming there is one, should show us which part of the chart is the pattern repeat.

If there's no photograph, we need to experiment, constructing a chart that repeats horizontally and vertically what we think is the pattern repeat. We'll wind up with charts like the two equivalent charts, which showed all forty-one stitches explicitly.

If the chart doesn't look right, then we do the same steps with another part of the chart. Eventually we'll figure out which part of the chart is the pattern repeat and which parts are the plus stitch(es) and row(s).

### An Alternate Way to Show the Pattern Repeat

If our paper chart has a compressed grid, then trying to draw thick lines at the edges of the pattern repeat might obscure some of the marks in adjoining grid cells, or even some of the grid cells themselves.

In such cases, we could skip a column to represent the border between the stitch repeat and the plus stitch(es), and we could leave a blank row between the row repeat and the plus row(s). If we're using plain grid cells to represent knit stitches, then our chart will have four enclosed sections.
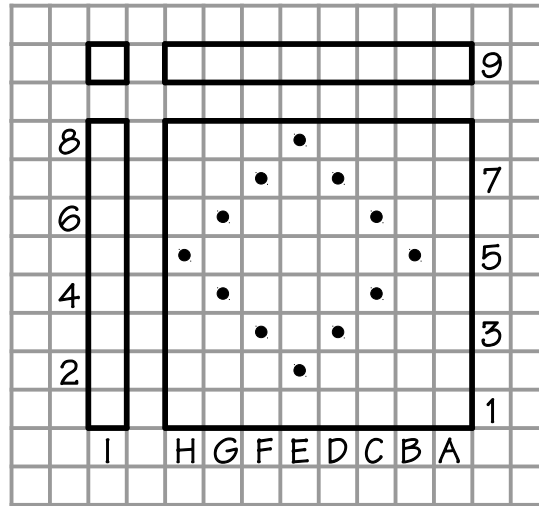
When we're charting in the computer, it can sometimes be fiddly to change the width of just one border of a table column, row, or cell to indicate the stitch or row repeat, and using the knitting font's stitch repeat boundary symbol can also be troublesome. If we don't want to work that hard, we do the same thing we can do on paper: use a blank table column and a blank table row to indicate the stitch and row repeats.
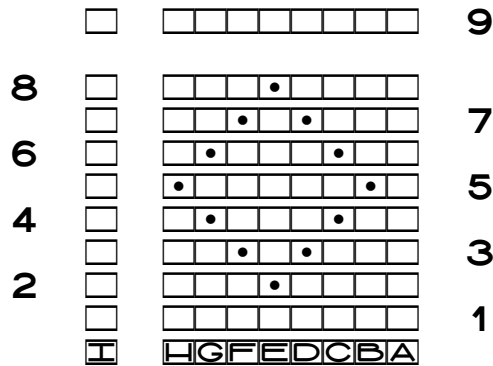
Note that both on paper and in the computer, marking the stitch repeat with a blank column means that the stitch repeat is shown explicitly, which might be a good thing.

Review: Working a Pattern Repeat

While all the small charts in this chapter have shown a design with only one plus stitch on only one edge, there are, in fact, countless patterns that need more than one plus stitch.

There could be two or more plus stitches on only one edge of the stitch repeat, or there

could be multiple plus stitches on both edges of the stitch repeat. And the number of plus stitch(es) before and after the stitch repeat do not have to be the same. In the same way, there might be any number of plus row(s) before the row repeat, after the row repeat, or both before and after the row repeat.[3]

Our charting rules need to account for all of these possibilities.

Charting Rules

> If there is only one stitch repeat boundary in the chart, then it should be clear which stitches are in the stitch repeat and which stitch(es) are the plus stitch(es).

> We work the stitch repeat as many times as necessary across each row, and we work the plus stitch(es) only once per row.

> If there is only one row repeat boundary in the chart, it should be clear which rows are in the row repeat and which row(s) are the plus row(s).

> We work the row repeat as many times as necessary, and we work plus row(s) only one time.

> If the stitch repeat is not explicitly marked in the plus row(s), we almost certainly need to work it on those row(s) anyway.

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[3] We'll see an example in the chapter "Tweaking a Chart."

> When a stitch dictionary has a line like "8 sts plus 3" before a pattern's instructions, it's telling us that we repeat eight of the stitches over and over across each row, and we work the three plus stitches on each row only once. If a pattern has the line "6 + 4," we will work the six stitches of the pattern repeat over and over on each row and the four plus stitches only once per row.

We also have a lesson learned that will help us work such charts accurately.

Lesson Learned

> For a more complex stitch pattern, we may want stitch markers between the pattern repeats so that we will know by the end of each repeat if we have made a mistake.

Working Pattern Repeats in the Round

In circular knitting, the end of a round technically does not meet the beginning of the round, at least not in the way that it would if we worked flat and sewed the beginning of each row exactly to its own end.

Instead, working in the round on circs or DPNs means that each round connects to the ones before and after it in the same way that a Slinky's coils connect to one another. The knitting rounds coil around and around and around at a slight angle, just like a Slinky.

There are advantages and disadvantages to working pattern repeats in the round.

An Advantage

For the most part, plus stitches are needed to make the left and right edges of a piece match.

But if we are working a continuous tube, as for the sleeve or body of a sweater, or for a sock or hat, then every pattern repeat is going to need to bump up against another pattern repeat.

Since there is no beginning or end—since every instance of the pattern is sandwiched between two other instances—there is usually no need at all for the plus stitches we use to balance out the left and right edges when we work in the flat.

So for a pattern whose stitch repeat is "12 + 2," we will almost certainly cast on some exact multiple of twelve, whether it's 84, 180, or 276, and we ignore the "+ 2" altogether.[4]

A Disadvantage

Since the end of each round doesn't actually meet its beginning, then we are going to have what's usually called a *jog* where the rounds start.

Imagine working the purl diamond motif around a hat. The first row of diamonds will be in rounds two through nine just like we expect. But when we come to the end of each round, the **end** of the **current** round is going to be at the same level as the **beginning** of the **next** round. Think about a Slinky made with a metal strip half an inch tall.

What in essence happens is that the last diamond is going to look like it's positioned one round higher than the first one. Even though our chart is correct and we work the chart perfectly, this swatch worked in the round demonstrates what happens.
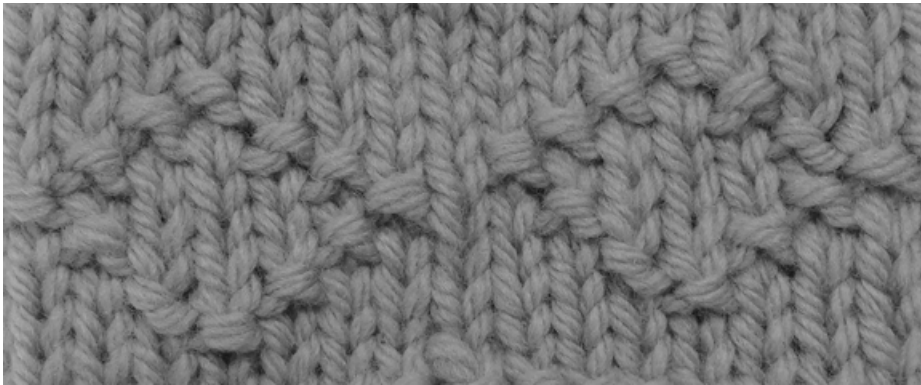
The diamond on the left is the first one in the circular swatch, and the diamond on the right is the last one. The stitch column between them is the first stitch of each round.

It's quite obvious that the first diamond's right point looks like it's one round lower than the last diamond's left point. In a larger project, though, with lots of repeats of the motif all the way around it, the jog probably won't be as noticeable as it is here, where we can see only the two repeats on either side of the beginning of the rounds.

The jog is just a fact of life when we knit circularly. We have to decide if the advantages of working in the round outweigh the disadvantages.

There are dodges we can do to minimize the jog, which can be especially noticeable in colorwork. The tricks used in colorwork will also work for many texture patterns. As always, swatching will show what works and what doesn't for a particular stitch pattern.

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[4] I do hate to hedge with the weasel words *almost certainly*, but there may be patterns that require plus stitches even when worked in the round.

Some Patterns Are Not Marker-Friendly

Some patterns and projects will not be as marker-friendly as the purl diamond motif used as the example in this chapter.

Marker-unfriendly patterns typically have cables or decreases that use stitches across the boundary between two pattern repeats. Let's look at an example with a project chart that shows several pattern repeats.

In this example, we do four-stitch cables all the way across, but since we want the entire width of the fabric to look like lots of strands all braided together, we can't have a number of stitches that divides evenly by four.

REALLY BIG BRAID

multiple of 4 + 2

C4R: sl 2 sts to cn and hold to back, K2, K2 from cn
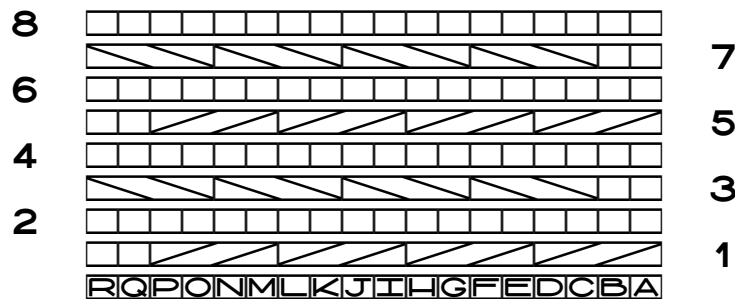C4L: sl 2 sts to cn and hold to front, K2, K2 from cn

Row 1 (RS): * C4R, rpt from * across, end K2.
Row 2 (and all WS rows): P.
Row 3: K2, * C4L, rpt from * across.
Rpt rows 1–4.

If we want four pattern repeats, we need eighteen stitches, four for each repeat and two for the plus stitches. The chart shows two row repeats.

Marking the Chart

We know the cables are four stitches wide, but where do we put the stitch repeat boundary, whether we're drawing a heavy line on paper, using the stitch repeat boundary symbol from the knitting font, or separating repeats on paper or in the computer with a blank column?

We can't put the stitch repeat boundary between stitches D and E on rows one and five, because we would have to cut the C4L symbols in half on rows three and seven. Nor can we put the boundary indicators between stitches H and I or between L and M. Again, those placements work for rows one and five, but they would split the cable symbols on rows three and seven into different stitch repeats.

And the marker placements that work for rows three and seven would likewise not work for rows one and five, for the exact same reasons.

Of course, stitch repeat boundaries in the chart and markers on our needles are not necessary for this pattern, but if we were working ten repeats of a hard lace pattern stitch that's thirty-five stitches wide, we would probably benefit greatly with markers on our work in progress.

Markers on the Needles

If we put stitch markers on our needles based on row one, then on row three they would be in the middle of each cable's stitches instead of between adjacent cables.

If we tried to place them based on row three, then when we started the row repeat over again after row four, the markers would again be in the wrong places for row five.

Keeping Markers Out of the Way

How can we use markers at the stitch repeat boundaries so that they don't get in the way as we work past them? There are several possibilities.

- 🧶 If we use any kind of marker that we can't open, we'll have to work to the first stitch involved in the cross-boundary knitting operation, slip stitches to the working needle until we can remove the marker, slip the stitches back to the source needle, then work the knitting operation, putting the marker on the working needle at the proper position within that operation's group of stitches.

  To minimize the number of times we have to do all these steps, we could put markers only every other or every third (or fourth or…) repeat. Doing so, though, means that we won't know until two or three (or four or…) repeats later that we made a mistake and need to frog—or even tink—back two or three (or four or…) stitch repeats.

- 🧶 If we use open-able markers, which we can remove without needing to slip stitches back and forth, we work to the first stitch needed for the multi-stitch operation, remove the marker, work the operation, then attach the marker in the proper place on the working needle.

- 🧶 Instead of putting open-able markers **around the needle**, we could put them **in the fabric** itself below the needle, positioning them vertically in the stitch repeat bound-

aries. We would move them upward as needed when they get too far from the live stitches to be useful. To help us keep the markers between the correct pairs of stitches, we could * put a spare marker above an existing lower marker, remove the lower marker, and repeat from *.

🧶 When we start a row where we must shift the markers closer to the beginning of the row, we work to the place where a marker now needs to be. * We place a spare marker on the working needle, do whatever's necessary to remove the marker that's in the way, perform the knitting operation, then work to the next place where a marker now needs to be. We repeat from *.

If we need to shift the markers toward the end of the row, we simply use the steps given in either of the first two bullet points.

🧶 For some patterns, we might be able to shift all the markers before we start the row or round. If we need to do, for example, a K2tog across a stitch repeat boundary, we could shift all the markers one stitch in the same direction (either left or right) before we start the row. If we need to do a four-stitch cable with two stitches from adjoining repeats, we could move all the markers two stitches in the same direction (either left or right).

If we move our stitch markers, we'll need to keep up with how they're in different places compared to the chart's stitch repeat boundaries.

Working in the Round

If we wanted to use this stitch pattern in the round, perhaps on a hat or sock (which would take more than the four repeats in the chart, of course), we would still have the same issues with positioning stitch repeat boundaries in the chart, whether on paper or in the computer, as well as trying to use stitch markers on our needles.

To keep the braid pattern going all the way around the project, we would have to work a C4R with the last two stitches of round one and the first two stitches of round two.

Round three would require the same trick. We would either work the first C4L early, using the last two stitches of round two and the first two of round three, or we would work the final C4L with the last two stitches of round three and the first two stitches of round four.[5]

If we were working a pattern with decreases across the stitch repeat boundaries, then we'd have to do the same trick as with the braid pattern, working a decrease with the last stitch of the current round and the first stitch of the following round.

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[5] My knitting imagination can't tell which option would look better. We would probably also want to keep special track of the beginning of the round in addition to keeping up with the differences between the locations of our markers and the chart's stitch repeat.

Some books will chart marker-unfriendly patterns with stitch repeat boundaries that bend back and forth.