



Crochet Pi scarf



Scarf details.

The scarf essentially consists of two scarves combined together - a white one with black symbols and a black one with white symbols. The white one has the symbols the correct way round while the black one, the reverse of the scarf, has the symbols laterally reversed.

The symbols are created by swapping the white and black thread between the two scarves.

This eliminates the need to cut the thread at all - the main body of the scarf is made from a continuous piece of white and a continuous piece of black thread. The only sewing in required is at the end and consists of the start and end of the white and black threads.

Since it is very easy to loose count/miss-remember which row is being worked on, it is worth having a paper copy of the pattern and symbol sheets to ensure that errors are not made.

It is also worth tying the scarf sides together during construction to ensure that the stitches joining the two sides together are not stretched.



The finished scarf is approximately 23cm wide and 230cm long, excluding the fringe. It weighs approximately 600g.

It indicates the first 20 decimal places of Pi displayed as

$$\pi=3.14159265358979323846$$

The symbols are on a 9 x 5 matrix with proportional spacing, with 4 stitches per pixel and 5 rows per pixel. This gives a symbol face of 36st by 25 rows plus 5 rows spacing between characters.

The tension of the fabric: 46 st and 61 rows to 200mm.

(=> single stitch is 4.35mm and row is 3.23mm)

Fringe length: 8cm.

Materials

Approximately 300g of unbleached 2/9.3nm merino wool,
Approximately 300g of black 2/9.3nm merino wool,
4mm crochet hook,
2.5mm crochet hook,
2 safety pins to hold the stitches that are not being worked.
Tapestry needle for sewing in.

Abbreviations

W white yarn

B black yarn

ch chain stitch

dc double crochet (American single crochet)

st stitch

r row

swap in this process the current is transferred from the current side of the scarf to the other side. The picture shows the white wool being transferred from working on the white front stitches to working on the white rear stitches. The black saved stitch (on the safety pin) and the black yarn are pulled to the front and the hook is pushed through the next rear stitch to be worked.

When this section of white stitches at the rear have been worked, the white stitch is saved on a safety pin, and the black stitches at the front are worked.

The next swap now takes place and the saved white stitch and the white yarn are brought to the front, and working is transferred with the black yarn to the black stitches at the rear.



Pattern

For a scarf with white as the front colour:-

Cast on 51 ch with the white yarn.

r1W Using white yarn, work 50dc into chains, 50 white stitches in total.

r1B Join in black yarn to the white chains, starting at the opposite end to the white start tail.

Work one black chain and then 1dc into first white chain.

Work one B dc into each white chain to the end, 50 black stitches in total.

Both yarns are now at the same end of the material.

For each colour:

r2WB 1ch, work 50dc to end.

r3WB 1ch, work 50dc to end.

r4WB 1ch, work 50dc to end.

r5WB 1ch, work 50dc to end.

r6WB 1ch, work 50dc to end.

r7WB 1ch, work 50dc to end.

r8WB 1ch, work 50dc to end.

r9WB 1ch, work 50dc to end.

r10WB 1ch, work 50dc to end.

-----start of Pi

r11WB 1ch, 31dc, swap, 4dc, swap, 15dc

r12WB 1ch, 15dc, swap, 4dc, swap, 31dc

r13WB 1ch, 31dc, swap, 4dc, swap, 15dc

r14WB 1ch, 15dc, swap, 4dc, swap, 31dc

r15WB 1ch, 31dc, swap, 4dc, swap, 15dc

r16WB 1ch, 15dc, swap, 20dc, swap, 15dc

r17WB 1ch, 15dc, swap, 20dc, swap, 15dc

r18WB 1ch, 15dc, swap, 20dc, swap, 15dc

r19WB 1ch, 15dc, swap, 20dc, swap, 15dc

r20WB 1ch, 15dc, swap, 20dc, swap, 15dc

r21WB 1ch, 31dc, swap, 4dc, swap, 15dc

r22WB 1ch, 15dc, swap, 4dc, swap, 31dc

r23WB 1ch, 31dc, swap, 4dc, swap, 15dc

r24WB 1ch, 15dc, swap, 4dc, swap, 31dc

r25WB 1ch, 31dc, swap, 4dc, swap, 15dc

r26WB 1ch, 15dc, swap, 20dc, swap, 15dc

r27WB 1ch, 15dc, swap, 20dc, swap, 15dc

r28WB 1ch, 15dc, swap, 20dc, swap, 15dc

r29WB 1ch, 15dc, swap, 20dc, swap, 15dc

r30WB 1ch, 31dc, swap, 4dc, swap, 15dc

r31WB 1ch, 15dc, swap, 4dc, swap, 31dc

r32WB 1ch, 31dc, swap, 4dc, swap, 15dc

r33WB 1ch, 15dc, swap, 4dc, swap, 31dc

r34WB 1ch, 31dc, swap, 4dc, swap, 15dc

-----end of Pi

r35WB 1ch, work 50dc to end.

r36WB 1ch, work 50dc to end.

r37WB 1ch, work 50dc to end.

r38WB 1ch, work 50dc to end.

r39WB 1ch, work 50dc to end.

-----start of =

r40WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r41WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r42WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r43WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r44WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r45WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r46WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r47WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r48WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r49WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r50WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r51WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r52WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r53WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r54WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r55WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r56WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r57WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r58WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r59WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r60WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r61WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r62WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc
r63WB	1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 23dc
r64WB	1ch, 23dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 15dc

-----end of =

r65WB	1ch, work 50dc to end.
r66WB	1ch, work 50dc to end.
r67WB	1ch, work 50dc to end.
r68WB	1ch, work 50dc to end.
r69WB	1ch, work 50dc to end.

-----start of 3

r70WB	1ch, 20dc, swap, 3dc, swap, 12dc, swap, 3dc, swap, 12dc
r71WB	1ch, 11dc, swap, 4dc, swap, 12dc, swap, 4dc, swap, 19dc
r72WB	1ch, 18dc, swap, 4dc, swap, 14dc, swap, 4dc, swap, 10dc
r73WB	1ch, 9dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 17dc
r74WB	1ch, 17dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 9dc
r75WB	1ch, 8dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 16dc
r76WB	1ch, 16dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 8dc
r77WB	1ch, 8dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 16dc
r78WB	1ch, 16dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 8dc
r79WB	1ch, 7dc, swap, 4dc, swap, 20dc, swap, 4dc, swap, 15dc
r80WB	1ch, 15dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 7dc
r81WB	1ch, 7dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 15dc
r82WB	1ch, 15dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 7dc
r83WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r84WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r85WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r86WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r87WB	1ch, 8dc, swap, 4dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 4dc, swap, 16dc
r88WB	1ch, 16dc, swap, 5dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 5dc, swap, 8dc
r89WB	1ch, 8dc, swap, 6dc, swap, 2dc, swap, 10dc, swap, 2dc, swap, 6dc, swap, 16dc

r90WB	1ch, 17dc, swap, 11dc, swap, 2dc, swap, 11dc, swap, 9dc
r91WB	1ch, 10dc, swap, 10dc, swap, 2dc, swap, 10dc, swap, 18dc
r92WB	1ch, 19dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 11dc
r93WB	1ch, 12dc, swap, 7dc, swap, 4dc, swap, 7dc, swap, 20dc
r94WB	1ch, 21dc, swap, 5dc, swap, 6dc, swap, 5dc, swap, 13dc
-----end of 3	
r95WB	1ch, work 50dc to end.
r96WB	1ch, work 50dc to end.
r97WB	1ch, work 50dc to end.
r98WB	1ch, work 50dc to end.
r99WB	1ch, work 50dc to end.
-----start of dp	
r100WB	1ch, 28dc, swap, 2dc, swap, 20dc
r101WB	1ch, 19dc, swap, 4dc, swap, 27dc
r102WB	1ch, 26dc, swap, 6dc, swap, 18dc
r103WB	1ch, 18dc, swap, 6dc, swap, 26dc
r104WB	1ch, 26dc, swap, 6dc, swap, 18dc
r105WB	1ch, 19dc, swap, 4dc, swap, 27dc
r106WB	1ch, 28dc, swap, 2dc, swap, 20dc
-----end of dp	
r107WB	1ch, work 50dc to end.
r108WB	1ch, work 50dc to end.
r109WB	1ch, work 50dc to end.
r110WB	1ch, work 50dc to end.
r111WB	1ch, work 50dc to end.
-----start of 1	
r112WB	1ch, 15dc, swap, 4dc, swap, 16dc, swap, 2dc, swap, 13dc
r113WB	1ch, 12dc, swap, 3dc, swap, 16dc, swap, 4dc, swap, 15dc
r114WB	1ch, 15dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 11dc
r115WB	1ch, 10dc, swap, 5dc, swap, 16dc, swap, 4dc, swap, 15dc
r116WB	1ch, 15dc, swap, 4dc, swap, 16dc, swap, 6dc, swap, 10dc
r117WB	1ch, 8dc, swap, 27dc, swap, 15dc
r118WB	1ch, 15dc, swap, 28dc, swap, 7dc
r119WB	1ch, 7dc, swap, 28dc, swap, 15dc
r120WB	1ch, 15dc, swap, 28dc, swap, 7dc
r121WB	1ch, 7dc, swap, 28dc, swap, 15dc
r122WB	1ch, 15dc, swap, 4dc, swap, 31dc
r123WB	1ch, 31dc, swap, 4dc, swap, 15dc
r124WB	1ch, 15dc, swap, 4dc, swap, 31dc
r125WB	1ch, 31dc, swap, 4dc, swap, 15dc
r126WB	1ch, 15dc, swap, 4dc, swap, 31dc
-----end of 1	
r127WB	1ch, work 50dc to end.
r128WB	1ch, work 50dc to end.
r129WB	1ch, work 50dc to end.
r130WB	1ch, work 50dc to end.
r131WB	1ch, work 50dc to end.
-----start of 4	
r132WB	1ch, 22dc, swap, 7dc, swap, 21dc
r133WB	1ch, 20dc, swap, 8dc, swap, 22dc
r134WB	1ch, 22dc, swap, 9dc, swap, 19dc
r135WB	1ch, 18dc, swap, 5dc, swap, 1dc, swap, 4dc, swap, 22dc

r136WB 1ch, 22dc, swap, 4dc, swap, 2dc, swap, 5dc, swap, 17dc
 r137WB 1ch, 16dc, swap, 5dc, swap, 3dc, swap, 4dc, swap, 22dc
 r138WB 1ch, 22dc, swap, 4dc, swap, 4dc, swap, 5dc, swap, 15dc
 r139WB 1ch, 14dc, swap, 5dc, swap, 5dc, swap, 4dc, swap, 22dc
 r140WB 1ch, 22dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 13dc
 r141WB 1ch, 12dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 22dc
 r142WB 1ch, 22dc, swap, 4dc, swap, 8dc, swap, 5dc, swap, 11dc
 r143WB 1ch, 10dc, swap, 5dc, swap, 9dc, swap, 4dc, swap, 22dc
 r144WB 1ch, 22dc, swap, 4dc, swap, 10dc, swap, 5dc, swap, 9dc
 r145WB 1ch, 8dc, swap, 5dc, swap, 11dc, swap, 4dc, swap, 22dc
 r146WB 1ch, 22dc, swap, 4dc, swap, 12dc, swap, 5dc, swap, 7dc
 r147WB 1ch, 7dc, swap, 28dc, swap, 15dc
 r148WB 1ch, 15dc, swap, 28dc, swap, 7dc
 r149WB 1ch, 7dc, swap, 28dc, swap, 15dc
 r150WB 1ch, 15dc, swap, 28dc, swap, 7dc
 r151WB 1ch, 7dc, swap, 28dc, swap, 15dc
 r152WB 1ch, 22dc, swap, 4dc, swap, 24dc
 r153WB 1ch, 24dc, swap, 4dc, swap, 22dc
 r154WB 1ch, 22dc, swap, 4dc, swap, 24dc
 r155WB 1ch, 24dc, swap, 4dc, swap, 22dc
 r156WB 1ch, 22dc, swap, 4dc, swap, 24dc

-----end of 4

r157WB 1ch, work 50dc to end.
 r158WB 1ch, work 50dc to end.
 r159WB 1ch, work 50dc to end.
 r160WB 1ch, work 50dc to end.
 r161WB 1ch, work 50dc to end.

-----start of 1

r162WB 1ch, 15dc, swap, 4dc, swap, 16dc, swap, 2dc, swap, 13dc
 r163WB 1ch, 12dc, swap, 3dc, swap, 16dc, swap, 4dc, swap, 15dc
 r164WB 1ch, 15dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 11dc
 r165WB 1ch, 10dc, swap, 5dc, swap, 16dc, swap, 4dc, swap, 15dc
 r166WB 1ch, 15dc, swap, 4dc, swap, 16dc, swap, 6dc, swap, 9dc
 r167WB 1ch, 8dc, swap, 27dc, swap, 15dc
 r168WB 1ch, 15dc, swap, 28dc, swap, 7dc
 r169WB 1ch, 7dc, swap, 28dc, swap, 15dc
 r170WB 1ch, 15dc, swap, 28dc, swap, 7dc
 r171WB 1ch, 7dc, swap, 28dc, swap, 15dc
 r172WB 1ch, 15dc, swap, 4dc, swap, 31dc
 r173WB 1ch, 31dc, swap, 4dc, swap, 15dc
 r174WB 1ch, 15dc, swap, 4dc, swap, 31dc
 r175WB 1ch, 31dc, swap, 4dc, swap, 15dc
 r176WB 1ch, 15dc, swap, 4dc, swap, 31dc

-----end of 1

r177WB 1ch, work 50dc to end.
 r178WB 1ch, work 50dc to end.
 r179WB 1ch, work 50dc to end.
 r180WB 1ch, work 50dc to end.
 r181WB 1ch, work 50dc to end.

-----start of 5

r182WB 1ch, 20dc, swap, 3dc, swap, 7dc, swap, 13dc, swap, 7dc
 r183WB 1ch, 7dc, swap, 13dc, swap, 7dc, swap, 4dc, swap, 19dc

r184WB 1ch, 18dc, swap, 4dc, swap, 8dc, swap, 13dc, swap, 7dc
 r185WB 1ch, 7dc, swap, 13dc, swap, 9dc, swap, 4dc, swap, 17dc
 r186WB 1ch, 17dc, swap, 4dc, swap, 9dc, swap, 13dc, swap, 7dc
 r187WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 16dc
 r188WB 1ch, 16dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r189WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 16dc
 r190WB 1ch, 16dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r191WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
 r192WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r193WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
 r194WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r195WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
 r196WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r197WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
 r198WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r199WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 5dc, swap, 9dc, swap, 4dc, swap, 16dc
 r200WB 1ch, 16dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 5dc, swap, 4dc, swap, 7dc
 r201WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 16dc
 r202WB 1ch, 17dc, swap, 17dc, swap, 5dc, swap, 4dc, swap, 7dc
 r203WB 1ch, 7dc, swap, 4dc, swap, 6dc, swap, 15dc, swap, 18dc
 r204WB 1ch, 19dc, swap, 13dc, swap, 7dc, swap, 4dc, swap, 7dc
 r205WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 11dc, swap, 20dc
 r206WB 1ch, 21dc, swap, 9dc, swap, 9dc, swap, 4dc, swap, 7dc

-----end of 5

r207WB 1ch, work 50dc to end.
 r208WB 1ch, work 50dc to end.
 r209WB 1ch, work 50dc to end.
 r210WB 1ch, work 50dc to end.
 r211WB 1ch, work 50dc to end.

-----start of 9

r212WB 1ch, 18dc, swap, 3dc, swap, 11dc, swap, 6dc, swap, 12dc
 r213WB 1ch, 11dc, swap, 8dc, swap, 11dc, swap, 3dc, swap, 17dc
 r214WB 1ch, 17dc, swap, 3dc, swap, 10dc, swap, 10dc, swap, 10dc
 r215WB 1ch, 10dc, swap, 11dc, swap, 9dc, swap, 4dc, swap, 16dc
 r216WB 1ch, 16dc, swap, 3dc, swap, 10dc, swap, 12dc, swap, 9dc
 r217WB 1ch, 8dc, swap, 5dc, swap, 4dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 15dc
 r218WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 8dc
 r219WB 1ch, 8dc, swap, 3dc, swap, 7dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 15dc
 r220WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 7dc
 r221WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r222WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r223WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r224WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r225WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r226WB 1ch, 15dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r227WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 16dc
 r228WB 1ch, 16dc, swap, 5dc, swap, 6dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r229WB 1ch, 8dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 17dc
 r230WB 1ch, 17dc, swap, 5dc, swap, 6dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 8dc
 r231WB 1ch, 9dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 5dc, swap, 6dc, swap, 18dc
 r232WB 1ch, 18dc, swap, 23dc, swap, 9dc
 r233WB 1ch, 10dc, swap, 21dc, swap, 19dc

r234WB 1ch, 20dc, swap, 19dc, swap, 11dc
 r235WB 1ch, 12dc, swap, 16dc, swap, 22dc
 r236WB 1ch, 24dc, swap, 13dc, swap, 13dc

-----end of 9

r237WB 1ch, work 50dc to end.
 r238WB 1ch, work 50dc to end.
 r239WB 1ch, work 50dc to end.
 r240WB 1ch, work 50dc to end.
 r241WB 1ch, work 50dc to end.

-----start of 2

r242WB 1ch, 15dc, swap, 6dc, swap, 14dc, swap, 3dc, swap, 12dc
 r243WB 1ch, 11dc, swap, 4dc, swap, 13dc, swap, 7dc, swap, 15dc
 r244WB 1ch, 15dc, swap, 8dc, swap, 13dc, swap, 4dc, swap, 10dc
 r245WB 1ch, 9dc, swap, 4dc, swap, 14dc, swap, 8dc, swap, 15dc
 r246WB 1ch, 15dc, swap, 9dc, swap, 13dc, swap, 4dc, swap, 9dc
 r247WB 1ch, 8dc, swap, 4dc, swap, 14dc, swap, 9dc, swap, 15dc
 r248WB 1ch, 15dc, swap, 4dc, swap, 1dc, swap, 5dc, swap, 13dc, swap, 4dc, swap, 8dc
 r249WB 1ch, 8dc, swap, 4dc, swap, 13dc, swap, 4dc, swap, 2dc, swap, 4dc, swap, 15dc
 r250WB 1ch, 15dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 12dc, swap, 4dc, swap, 8dc
 r251WB 1ch, 7dc, swap, 4dc, swap, 13dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 15dc
 r252WB 1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 12dc, swap, 4dc, swap, 7dc
 r253WB 1ch, 7dc, swap, 4dc, swap, 11dc, swap, 5dc, swap, 4dc, swap, 4dc, swap, 15dc
 r254WB 1ch, 15dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 7dc
 r255WB 1ch, 7dc, swap, 4dc, swap, 10dc, swap, 5dc, swap, 5dc, swap, 4dc, swap, 15dc
 r256WB 1ch, 15dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 9dc, swap, 4dc, swap, 7dc
 r257WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 15dc
 r258WB 1ch, 15dc, swap, 4dc, swap, 7dc, swap, 5dc, swap, 8dc, swap, 4dc, swap, 7dc
 r259WB 1ch, 8dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 8dc, swap, 4dc, swap, 15dc
 r260WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 5dc, swap, 4dc, swap, 5dc, swap, 8dc
 r261WB 1ch, 8dc, swap, 6dc, swap, 2dc, swap, 5dc, swap, 10dc, swap, 4dc, swap, 15dc
 r262WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 11dc, swap, 9dc
 r263WB 1ch, 10dc, swap, 9dc, swap, 12dc, swap, 4dc, swap, 15dc
 r264WB 1ch, 15dc, swap, 4dc, swap, 12dc, swap, 8dc, swap, 11dc
 r265WB 1ch, 12dc, swap, 6dc, swap, 13dc, swap, 4dc, swap, 15dc
 r266WB 1ch, 15dc, swap, 4dc, swap, 14dc, swap, 4dc, swap, 13dc

-----end of 2

r267WB 1ch, work 50dc to end.
 r268WB 1ch, work 50dc to end.
 r269WB 1ch, work 50dc to end.
 r270WB 1ch, work 50dc to end.
 r271WB 1ch, work 50dc to end.

-----start of 6

r272WB 1ch, 21dc, swap, 15dc, swap, 14dc
 r273WB 1ch, 13dc, swap, 18dc, swap, 19dc
 r274WB 1ch, 18dc, swap, 20dc, swap, 12dc
 r275WB 1ch, 11dc, swap, 22dc, swap, 17dc
 r276WB 1ch, 16dc, swap, 24dc, swap, 10dc
 r277WB 1ch, 9dc, swap, 6dc, swap, 6dc, swap, 4dc, swap, 3dc, swap, 6dc, swap, 16dc
 r278WB 1ch, 15dc, swap, 6dc, swap, 5dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 9dc
 r279WB 1ch, 8dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 15dc
 r280WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 3dc, swap, 8dc, swap, 4dc, swap, 8dc
 r281WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc

r282WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r283WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r284WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r285WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r286WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r287WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r288WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r289WB 1ch, 8dc, swap, 3dc, swap, 9dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 15dc
 r290WB 1ch, 15dc, swap, 6dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 4dc, swap, 8dc
 r291WB 1ch, 8dc, swap, 4dc, swap, 8dc, swap, 6dc, swap, 2dc, swap, 7dc, swap, 15dc
 r292WB 1ch, 16dc, swap, 13dc, swap, 8dc, swap, 4dc, swap, 9dc
 r293WB 1ch, 9dc, swap, 4dc, swap, 8dc, swap, 12dc, swap, 17dc
 r294WB 1ch, 18dc, swap, 10dc, swap, 8dc, swap, 4dc, swap, 10dc
 r295WB 1ch, 11dc, swap, 4dc, swap, 8dc, swap, 8dc, swap, 19dc
 r296WB 1ch, 21dc, swap, 4dc, swap, 10dc, swap, 3dc, swap, 12dc

-----end of 6

r297WB 1ch, work 50dc to end.
 r298WB 1ch, work 50dc to end.
 r299WB 1ch, work 50dc to end.
 r300WB 1ch, work 50dc to end.
 r301WB 1ch, work 50dc to end.

-----start of 5

r302WB 1ch, 20dc, swap, 3dc, swap, 7dc, swap, 13dc, swap, 7dc
 r303WB 1ch, 7dc, swap, 13dc, swap, 7dc, swap, 4dc, swap, 19dc
 r304WB 1ch, 18dc, swap, 4dc, swap, 8dc, swap, 13dc, swap, 7dc
 r305WB 1ch, 7dc, swap, 13dc, swap, 9dc, swap, 4dc, swap, 17dc
 r306WB 1ch, 17dc, swap, 4dc, swap, 9dc, swap, 13dc, swap, 7dc
 r307WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 16dc
 r308WB 1ch, 16dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r309WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 16dc
 r310WB 1ch, 16dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r311WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
 r312WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r313WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
 r314WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r315WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
 r316WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r317WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
 r318WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
 r319WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 5dc, swap, 9dc, swap, 4dc, swap, 16dc
 r320WB 1ch, 16dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 5dc, swap, 4dc, swap, 7dc
 r321WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 16dc
 r322WB 1ch, 17dc, swap, 17dc, swap, 5dc, swap, 4dc, swap, 7dc
 r323WB 1ch, 7dc, swap, 4dc, swap, 6dc, swap, 15dc, swap, 18dc
 r324WB 1ch, 19dc, swap, 13dc, swap, 7dc, swap, 4dc, swap, 7dc
 r325WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 11dc, swap, 20dc
 r326WB 1ch, 21dc, swap, 9dc, swap, 9dc, swap, 4dc, swap, 7dc

-----end of 5

r327WB 1ch, work 50dc to end
 r328WB 1ch, work 50dc to end
 r329WB 1ch, work 50dc to end
 r330WB 1ch, work 50dc to end

r331WB	1ch, work 50dc to end
-----start of 3	
r332WB	1ch, 20dc, swap, 3dc, swap, 12dc, swap, 3dc, swap, 12dc
r333WB	1ch, 11dc, swap, 4dc, swap, 12dc, swap, 3dc, swap, 19dc
r334WB	1ch, 18dc, swap, 4dc, swap, 14dc, swap, 4dc, swap, 10dc
r335WB	1ch, 9dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 17dc
r336WB	1ch, 17dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 9dc
r337WB	1ch, 8dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 16dc
r338WB	1ch, 16dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 8dc
r339WB	1ch, 8dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 16dc
r340WB	1ch, 16dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 8dc
r341WB	1ch, 7dc, swap, 4dc, swap, 20dc, swap, 4dc, swap, 15dc
r342WB	1ch, 15dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 7dc
r343WB	1ch, 7dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 15dc
r344WB	1ch, 15dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 7dc
r345WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r346WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r347WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r348WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r349WB	1ch, 8dc, swap, 4dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 4dc, swap, 16dc
r350WB	1ch, 16dc, swap, 5dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 5dc, swap, 8dc
r351WB	1ch, 8dc, swap, 6dc, swap, 2dc, swap, 10dc, swap, 2dc, swap, 6dc, swap, 16dc
r352WB	1ch, 17dc, swap, 11dc, swap, 2dc, swap, 11dc, swap, 9dc
r353WB	1ch, 10dc, swap, 10dc, swap, 2dc, swap, 10dc, swap, 18dc
r354WB	1ch, 19dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 11dc
r355WB	1ch, 12dc, swap, 7dc, swap, 4dc, swap, 7dc, swap, 20dc
r356WB	1ch, 21dc, swap, 5dc, swap, 6dc, swap, 5dc, swap, 13dc
-----end of 3	
r357WB	1ch, work 50dc to end
r358WB	1ch, work 50dc to end
r359WB	1ch, work 50dc to end
r360WB	1ch, work 50dc to end
r361WB	1ch, work 50dc to end
-----start of 5	
r362WB	1ch, 20dc, swap, 3dc, swap, 7dc, swap, 13dc, swap, 7dc
r363WB	1ch, 7dc, swap, 13dc, swap, 7dc, swap, 4dc, swap, 19dc
r364WB	1ch, 18dc, swap, 4dc, swap, 8dc, swap, 13dc, swap, 7dc
r365WB	1ch, 7dc, swap, 13dc, swap, 9dc, swap, 4dc, swap, 17dc
r366WB	1ch, 17dc, swap, 4dc, swap, 9dc, swap, 13dc, swap, 7dc
r367WB	1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 16dc
r368WB	1ch, 16dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
r369WB	1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 16dc
r370WB	1ch, 16dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
r371WB	1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
r372WB	1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
r373WB	1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
r374WB	1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
r375WB	1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
r376WB	1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
r377WB	1ch, 7dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 15dc
r378WB	1ch, 15dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 7dc
r379WB	1ch, 7dc, swap, 4dc, swap, 5dc, swap, 5dc, swap, 9dc, swap, 4dc, swap, 16dc

r380WB	1ch, 16dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 5dc, swap, 4dc, swap, 7dc
r381WB	1ch, 7dc, swap, 4dc, swap, 5dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 16dc
r382WB	1ch, 17dc, swap, 17dc, swap, 5dc, swap, 4dc, swap, 7dc
r383WB	1ch, 7dc, swap, 4dc, swap, 6dc, swap, 15dc, swap, 18dc
r384WB	1ch, 19dc, swap, 13dc, swap, 7dc, swap, 4dc, swap, 7dc
r385WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 11dc, swap, 20dc
r386WB	1ch, 21dc, swap, 9dc, swap, 9dc, swap, 4dc, swap, 7dc
-----end of 5	
r387WB	1ch, work 50dc to end
r388WB	1ch, work 50dc to end
r389WB	1ch, work 50dc to end
r390WB	1ch, work 50dc to end
r391WB	1ch, work 50dc to end
-----start of 8	
r392WB	1ch, 21dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 13dc
r393WB	1ch, 12dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 20dc
r394WB	1ch, 19dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 11dc
r395WB	1ch, 10dc, swap, 9dc, swap, 4dc, swap, 9dc, swap, 18dc
r396WB	1ch, 17dc, swap, 11dc, swap, 2dc, swap, 11dc, swap, 9dc
r397WB	1ch, 9dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 2dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 17dc
r398WB	1ch, 16dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 4dc, swap, 8dc
r399WB	1ch, 8dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 4dc, swap, 16dc
r400WB	1ch, 15dc, swap, 4dc, swap, 7dc, swap, 6dc, swap, 7dc, swap, 4dc, swap, 7dc
r401WB	1ch, 7dc, swap, 4dc, swap, 7dc, swap, 6dc, swap, 7dc, swap, 4dc, swap, 15dc
r402WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r403WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r404WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r405WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r406WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r407WB	1ch, 7dc, swap, 4dc, swap, 7dc, swap, 6dc, swap, 7dc, swap, 4dc, swap, 15dc
r408WB	1ch, 15dc, swap, 4dc, swap, 7dc, swap, 6dc, swap, 7dc, swap, 4dc, swap, 7dc
r409WB	1ch, 8dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 4dc, swap, 16dc
r410WB	1ch, 16dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 4dc, swap, 8dc
r411WB	1ch, 9dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 2dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 17dc
r412WB	1ch, 17dc, swap, 11dc, swap, 2dc, swap, 11dc, swap, 9dc
r413WB	1ch, 10dc, swap, 9dc, swap, 4dc, swap, 9dc, swap, 18dc
r414WB	1ch, 19dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 11dc
r415WB	1ch, 12dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 20dc
r416WB	1ch, 21dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 13dc
-----end of 8	
r417WB	1ch, work 50dc to end
r418WB	1ch, work 50dc to end
r419WB	1ch, work 50dc to end
r420WB	1ch, work 50dc to end
r421WB	1ch, work 50dc to end
-----start of 9	
r422WB	1ch, 18dc, swap, 3dc, swap, 11dc, swap, 6dc, swap, 12dc
r423WB	1ch, 11dc, swap, 8dc, swap, 11dc, swap, 3dc, swap, 17dc
r424WB	1ch, 17dc, swap, 3dc, swap, 10dc, swap, 10dc, swap, 10dc
r425WB	1ch, 10dc, swap, 11dc, swap, 9dc, swap, 4dc, swap, 16dc

r426WB 1ch, 16dc, swap, 3dc, swap, 10dc, swap, 12dc, swap, 9dc
 r427WB 1ch, 8dc, swap, 5dc, swap, 4dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 15dc
 r428WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 8dc
 r429WB 1ch, 8dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 15dc
 r430WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 7dc
 r431WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r432WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r433WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r434WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r435WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r436WB 1ch, 15dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r437WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 16dc
 r438WB 1ch, 16dc, swap, 5dc, swap, 6dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r439WB 1ch, 7dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 17dc
 r440WB 1ch, 17dc, swap, 5dc, swap, 6dc, swap, 4dc, swap, 5dc, swap, 5dc, swap, 8dc
 r441WB 1ch, 9dc, swap, 5dc, swap, 3dc, swap, 4dc, swap, 5dc, swap, 6dc, swap, 18dc
 r442WB 1ch, 18dc, swap, 23dc, swap, 9dc
 r443WB 1ch, 10dc, swap, 21dc, swap, 19dc
 r444WB 1ch, 20dc, swap, 19dc, swap, 11dc
 r445WB 1ch, 12dc, swap, 16dc, swap, 22dc
 r446WB 1ch, 24dc, swap, 13dc, swap, 13dc

-----end of 9

r447WB 1ch, work 50dc to end
 r448WB 1ch, work 50dc to end
 r449WB 1ch, work 50dc to end
 r450WB 1ch, work 50dc to end
 r451WB 1ch, work 50dc to end

-----start of 7

r452WB 1ch, 39dc, swap, 4dc, swap, 7dc
 r453WB 1ch, 7dc, swap, 4dc, swap, 39dc
 r454WB 1ch, 39dc, swap, 4dc, swap, 7dc
 r455WB 1ch, 7dc, swap, 4dc, swap, 39dc
 r456WB 1ch, 39dc, swap, 4dc, swap, 7dc
 r457WB 1ch, 7dc, swap, 4dc, swap, 18dc, swap, 6dc, swap, 15dc
 r458WB 1ch, 15dc, swap, 8dc, swap, 16dc, swap, 4dc, swap, 7dc
 r459WB 1ch, 7dc, swap, 4dc, swap, 15dc, swap, 9dc, swap, 15dc
 r460WB 1ch, 15dc, swap, 10dc, swap, 14dc, swap, 4dc, swap, 7dc
 r461WB 1ch, 7dc, swap, 4dc, swap, 13dc, swap, 11dc, swap, 15dc
 r462WB 1ch, 21dc, swap, 6dc, swap, 12dc, swap, 4dc, swap, 7dc
 r463WB 1ch, 7dc, swap, 4dc, swap, 11dc, swap, 5dc, swap, 23dc
 r464WB 1ch, 24dc, swap, 5dc, swap, 10dc, swap, 4dc, swap, 7dc
 r465WB 1ch, 7dc, swap, 4dc, swap, 9dc, swap, 5dc, swap, 25dc
 r466WB 1ch, 26dc, swap, 5dc, swap, 8dc, swap, 4dc, swap, 7dc
 r467WB 1ch, 7dc, swap, 4dc, swap, 7dc, swap, 5dc, swap, 27dc
 r468WB 1ch, 28dc, swap, 5dc, swap, 6dc, swap, 4dc, swap, 7dc
 r469WB 1ch, 7dc, swap, 4dc, swap, 5dc, swap, 5dc, swap, 28dc
 r470WB 1ch, 30dc, swap, 5dc, swap, 4dc, swap, 4dc, swap, 7dc
 r471WB 1ch, 7dc, swap, 4dc, swap, 2dc, swap, 6dc, swap, 31dc
 r472WB 1ch, 32dc, swap, 11dc, swap, 7dc
 r473WB 1ch, 7dc, swap, 10dc, swap, 33dc
 r474WB 1ch, 34dc, swap, 9dc, swap, 7dc
 r475WB 1ch, 7dc, swap, 8dc, swap, 35dc

r476WB	1ch, 37dc, swap, 6dc, swap, 7dc
-----end of 7	
r477WB	1ch, work 50dc to end
r478WB	1ch, work 50dc to end
r479WB	1ch, work 50dc to end
r480WB	1ch, work 50dc to end
r481WB	1ch, work 50dc to end
-----start of 9	
r482WB	1ch, 18dc, swap, 3dc, swap, 11dc, swap, 6dc, swap, 12dc
r483WB	1ch, 11dc, swap, 8dc, swap, 11dc, swap, 3dc, swap, 7dc
r484WB	1ch, 17dc, swap, 3dc, swap, 10dc, swap, 10dc, swap, 10dc
r485WB	1ch, 10dc, swap, 11dc, swap, 9dc, swap, 4dc, swap, 16dc
r486WB	1ch, 16dc, swap, 3dc, swap, 10dc, swap, 12dc, swap, 9dc
r487WB	1ch, 8dc, swap, 5dc, swap, 4dc, swap, 4dc, swap, 10dc, swap, 4dc, swap, 15dc
r488WB	1ch, 15dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 8dc
r489WB	1ch, 8dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 15dc
r490WB	1ch, 15dc, swap, 4dc, swap, 9dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 7dc
r491WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r492WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r493WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r494WB	1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r495WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
r496WB	1ch, 15dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r497WB	1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 16dc
r498WB	1ch, 16dc, swap, 5dc, swap, 6dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
r499WB	1ch, 8dc, swap, 4dc, swap, 7dc, swap, 4dc, swap, 6dc, swap, 4dc, swap, 17dc
r500WB	1ch, 17dc, swap, 5dc, swap, 6dc, swap, 4dc, swap, 5dc, swap, 5dc, swap, 8dc
r501WB	1ch, 9dc, swap, 5dc, swap, 3dc, swap, 4dc, swap, 5dc, swap, 6dc, swap, 18dc
r502WB	1ch, 18dc, swap, 23dc, swap, 9dc
r503WB	1ch, 10dc, swap, 21dc, swap, 19dc
r504WB	1ch, 20dc, swap, 19dc, swap, 11dc
r505WB	1ch, 12dc, swap, 16dc, swap, 22dc
r506WB	1ch, 24dc, swap, 13dc, swap, 13dc
-----end of 9	
r507WB	1ch, work 50dc to end
r508WB	1ch, work 50dc to end
r509WB	1ch, work 50dc to end
r510WB	1ch, work 50dc to end
r511WB	1ch, work 50dc to end
-----start of 3	
r512WB	1ch, 20dc, swap, 3dc, swap, 12dc, swap, 3dc, swap, 12dc
r513WB	1ch, 11dc, swap, 4dc, swap, 12dc, swap, 4dc, swap, 19dc
r514WB	1ch, 18dc, swap, 4dc, swap, 14dc, swap, 4dc, swap, 10dc
r515WB	1ch, 9dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 17dc
r516WB	1ch, 17dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 9dc
r517WB	1ch, 8dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 16dc
r518WB	1ch, 16dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 8dc
r519WB	1ch, 8dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 16dc
r520WB	1ch, 16dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 8dc
r521WB	1ch, 7dc, swap, 4dc, swap, 20dc, swap, 4dc, swap, 15dc
r522WB	1ch, 15dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 7dc
r523WB	1ch, 7dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 15dc

r524WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 7dc
 r525WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r526WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 2dc, swap, 8dc, swap, 4dc, swap, 7dc
 r527WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r528WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r529WB 1ch, 8dc, swap, 4dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 4dc, swap, 16dc
 r530WB 1ch, 16dc, swap, 5dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 5dc, swap, 8dc
 r531WB 1ch, 8dc, swap, 6dc, swap, 2dc, swap, 10dc, swap, 2dc, swap, 6dc, swap, 16dc
 r532WB 1ch, 17dc, swap, 11dc, swap, 2dc, swap, 11dc, swap, 9dc
 r533WB 1ch, 10dc, swap, 10dc, swap, 2dc, swap, 10dc, swap, 18dc
 r534WB 1ch, 19dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 11dc
 r535WB 1ch, 12dc, swap, 7dc, swap, 4dc, swap, 7dc, swap, 20dc
 r536WB 1ch, 21dc, swap, 5dc, swap, 6dc, swap, 5dc, swap, 13dc

-----end of 3

r537WB 1ch, work 50dc to end
 r538WB 1ch, work 50dc to end
 r539WB 1ch, work 50dc to end
 r540WB 1ch, work 50dc to end
 r541WB 1ch, work 50dc to end

-----start of 2

r542WB 1ch, 15dc, swap, 6dc, swap, 14dc, swap, 3dc, swap, 12dc
 r543WB 1ch, 11dc, swap, 4dc, swap, 13dc, swap, 7dc, swap, 15dc
 r544WB 1ch, 15dc, swap, 8dc, swap, 13dc, swap, 4dc, swap, 10dc
 r545WB 1ch, 9dc, swap, 4dc, swap, 14dc, swap, 8dc, swap, 15dc
 r546WB 1ch, 15dc, swap, 9dc, swap, 13dc, swap, 4dc, swap, 9dc
 r547WB 1ch, 8dc, swap, 4dc, swap, 14dc, swap, 9dc, swap, 15dc
 r548WB 1ch, 15dc, swap, 4dc, swap, 1dc, swap, 5dc, swap, 13dc, swap, 4dc, swap, 8dc
 r549WB 1ch, 8dc, swap, 4dc, swap, 13dc, swap, 4dc, swap, 2dc, swap, 4dc, swap, 15dc
 r550WB 1ch, 15dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 12dc, swap, 4dc, swap, 8dc
 r551WB 1ch, 7dc, swap, 4dc, swap, 13dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 15dc
 r552WB 1ch, 15dc, swap, 4dc, swap, 4dc, swap, 4dc, swap, 12dc, swap, 4dc, swap, 7dc
 r553WB 1ch, 7dc, swap, 4dc, swap, 11dc, swap, 5dc, swap, 4dc, swap, 4dc, swap, 15dc
 r554WB 1ch, 15dc, swap, 4dc, swap, 5dc, swap, 4dc, swap, 11dc, swap, 4dc, swap, 7dc
 r555WB 1ch, 7dc, swap, 4dc, swap, 10dc, swap, 5dc, swap, 5dc, swap, 4dc, swap, 15dc
 r556WB 1ch, 15dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 9dc, swap, 4dc, swap, 7dc
 r557WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 15dc
 r558WB 1ch, 15dc, swap, 4dc, swap, 7dc, swap, 5dc, swap, 8dc, swap, 4dc, swap, 7dc
 r559WB 1ch, 8dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 8dc, swap, 4dc, swap, 15dc
 r560WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 5dc, swap, 4dc, swap, 5dc, swap, 8dc
 r561WB 1ch, 8dc, swap, 6dc, swap, 2dc, swap, 5dc, swap, 10dc, swap, 4dc, swap, 15dc
 r562WB 1ch, 15dc, swap, 4dc, swap, 11dc, swap, 11dc, swap, 9dc
 r563WB 1ch, 10dc, swap, 9dc, swap, 12dc, swap, 4dc, swap, 15dc
 r564WB 1ch, 15dc, swap, 4dc, swap, 12dc, swap, 8dc, swap, 11dc
 r565WB 1ch, 12dc, swap, 6dc, swap, 13dc, swap, 4dc, swap, 15dc
 r566WB 1ch, 15dc, swap, 4dc, swap, 14dc, swap, 4dc, swap, 13dc

-----end of 2

r567WB 1ch, work 50dc to end
 r568WB 1ch, work 50dc to end
 r569WB 1ch, work 50dc to end
 r570WB 1ch, work 50dc to end
 r571WB 1ch, work 50dc to end

-----start of 3

r572WB 1ch, 20dc, swap, 3dc, swap, 12dc, swap, 3dc, swap, 12dc
 r573WB 1ch, 11dc, swap, 4dc, swap, 12dc, swap, 4dc, swap, 19dc
 r574WB 1ch, 18dc, swap, 4dc, swap, 14dc, swap, 4dc, swap, 10dc
 r575WB 1ch, 9dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 17dc
 r576WB 1ch, 17dc, swap, 4dc, swap, 16dc, swap, 4dc, swap, 9dc
 r577WB 1ch, 8dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 16dc
 r578WB 1ch, 16dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 8dc
 r579WB 1ch, 8dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 16dc
 r580WB 1ch, 16dc, swap, 4dc, swap, 18dc, swap, 4dc, swap, 8dc
 r581WB 1ch, 7dc, swap, 4dc, swap, 20dc, swap, 4dc, swap, 15dc
 r582WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 7dc
 r583WB 1ch, 7dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 15dc
 r584WB 1ch, 15dc, swap, 4dc, swap, 9dc, swap, 2dc, swap, 9dc, swap, 4dc, swap, 7dc
 r585WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r586WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r587WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r588WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r589WB 1ch, 8dc, swap, 4dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 4dc, swap, 16dc
 r590WB 1ch, 16dc, swap, 5dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 5dc, swap, 8dc
 r591WB 1ch, 8dc, swap, 6dc, swap, 2dc, swap, 10dc, swap, 2dc, swap, 6dc, swap, 16dc
 r592WB 1ch, 17dc, swap, 11dc, swap, 2dc, swap, 11dc, swap, 9dc
 r593WB 1ch, 10dc, swap, 10dc, swap, 2dc, swap, 10dc, swap, 18dc
 r594WB 1ch, 19dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 11dc
 r595WB 1ch, 12dc, swap, 7dc, swap, 4dc, swap, 7dc, swap, 20dc
 r596WB 1ch, 21dc, swap, 5dc, swap, 6dc, swap, 5dc, swap, 13dc

-----end of 3

r597WB 1ch, work 50dc to end
 r598WB 1ch, work 50dc to end
 r599WB 1ch, work 50dc to end
 r600WB 1ch, work 50dc to end
 r601WB 1ch, work 50dc to end

-----start of 8

r602WB 1ch, 21dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 13dc
 r603WB 1ch, 12dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 20dc
 r604WB 1ch, 19dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 11dc
 r605WB 1ch, 10dc, swap, 9dc, swap, 4dc, swap, 9dc, swap, 18dc
 r606WB 1ch, 17dc, swap, 11dc, swap, 2dc, swap, 11dc, swap, 9dc
 r607WB 1ch, 9dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 2dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 17dc
 r608WB 1ch, 16dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 4dc, swap, 8dc
 r609WB 1ch, 8dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 4dc, swap, 16dc
 r610WB 1ch, 15dc, swap, 4dc, swap, 7dc, swap, 6dc, swap, 7dc, swap, 4dc, swap, 7dc
 r611WB 1ch, 7dc, swap, 4dc, swap, 7dc, swap, 6dc, swap, 7dc, swap, 4dc, swap, 15dc
 r612WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r613WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r614WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r615WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r616WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r617WB 1ch, 7dc, swap, 4dc, swap, 7dc, swap, 6dc, swap, 7dc, swap, 4dc, swap, 15dc
 r618WB 1ch, 15dc, swap, 4dc, swap, 7dc, swap, 6dc, swap, 7dc, swap, 4dc, swap, 7dc
 r619WB 1ch, 8dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 4dc, swap, 16dc
 r620WB 1ch, 16dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 5dc, swap, 4dc, swap, 8dc

r621WB 1ch, 9dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 2dc, swap, 4dc, swap, 3dc, swap, 4dc, swap, 17dc

r622WB 1ch, 17dc, swap, 11dc, swap, 2dc, swap, 11dc, swap, 9dc

r623WB 1ch, 10dc, swap, 9dc, swap, 4dc, swap, 9dc, swap, 18dc

r624WB 1ch, 19dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 11dc

r625WB 1ch, 12dc, swap, 6dc, swap, 6dc, swap, 6dc, swap, 20dc

r626WB 1ch, 21dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 13dc

-----end of 8

r627WB 1ch, work 50dc to end

r628WB 1ch, work 50dc to end

r629WB 1ch, work 50dc to end

r630WB 1ch, work 50dc to end

r631WB 1ch, work 50dc to end

-----start of 4

r632WB 1ch, 22dc, swap, 4dc, swap, 21dc

r633WB 1ch, 20dc, swap, 4dc, swap, 22dc

r634WB 1ch, 22dc, swap, 9dc, swap, 19dc

r635WB 1ch, 18dc, swap, 5dc, swap, 1dc, swap, 4dc, swap, 22dc

r636WB 1ch, 22dc, swap, 4dc, swap, 2dc, swap, 5dc, swap, 17dc

r637WB 1ch, 16dc, swap, 5dc, swap, 3dc, swap, 4dc, swap, 22dc

r638WB 1ch, 22dc, swap, 4dc, swap, 4dc, swap, 5dc, swap, 15dc

r639WB 1ch, 14dc, swap, 5dc, swap, 5dc, swap, 4dc, swap, 22dc

r640WB 1ch, 22dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 13dc

r641WB 1ch, 12dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 22dc

r642WB 1ch, 22dc, swap, 4dc, swap, 8dc, swap, 5dc, swap, 11dc

r643WB 1ch, 10dc, swap, 5dc, swap, 9dc, swap, 4dc, swap, 22dc

r644WB 1ch, 22dc, swap, 4dc, swap, 10dc, swap, 5dc, swap, 9dc

r645WB 1ch, 8dc, swap, 5dc, swap, 11dc, swap, 4dc, swap, 22dc

r646WB 1ch, 22dc, swap, 4dc, swap, 12dc, swap, 5dc, swap, 7dc

r647WB 1ch, 7dc, swap, 28dc, swap, 15dc

r648WB 1ch, 15dc, swap, 28dc, swap, 7dc

r649WB 1ch, 7dc, swap, 28dc, swap, 15dc

r650WB 1ch, 15dc, swap, 28dc, swap, 7dc

r651WB 1ch, 7dc, swap, 28dc, swap, 15dc

r652WB 1ch, 22dc, swap, 4dc, swap, 24dc

r653WB 1ch, 24dc, swap, 4dc, swap, 22dc

r654WB 1ch, 22dc, swap, 4dc, swap, 24dc

r655WB 1ch, 24dc, swap, 4dc, swap, 22dc

r656WB 1ch, 22dc, swap, 4dc, swap, 24dc

-----end of 4

r657WB 1ch, work 50dc to end

r658WB 1ch, work 50dc to end

r659WB 1ch, work 50dc to end

r660WB 1ch, work 50dc to end

r661WB 1ch, work 50dc to end

-----start of 6

r662WB 1ch, 21dc, swap, 15dc, swap, 14dc

r663WB 1ch, 13dc, swap, 18dc, swap, 19dc

r664WB 1ch, 18dc, swap, 20dc, swap, 12dc

r665WB 1ch, 11dc, swap, 22dc, swap, 17dc

r666WB 1ch, 16dc, swap, 24dc, swap, 10dc

r667WB 1ch, 9dc, swap, 6dc, swap, 6dc, swap, 4dc, swap, 3dc, swap, 6dc, swap, 16dc

r668WB 1ch, 15dc, swap, 6dc, swap, 5dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 9dc
 r669WB 1ch, 8dc, swap, 5dc, swap, 7dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 15dc
 r670WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 3dc, swap, 8dc, swap, 4dc, swap, 8dc
 r671WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r672WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r673WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r674WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r675WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r676WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r677WB 1ch, 7dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 15dc
 r678WB 1ch, 15dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 8dc, swap, 4dc, swap, 7dc
 r679WB 1ch, 8dc, swap, 3dc, swap, 9dc, swap, 4dc, swap, 6dc, swap, 5dc, swap, 15dc
 r680WB 1ch, 15dc, swap, 6dc, swap, 4dc, swap, 5dc, swap, 8dc, swap, 4dc, swap, 8dc
 r681WB 1ch, 8dc, swap, 4dc, swap, 8dc, swap, 6dc, swap, 2dc, swap, 6dc, swap, 16dc
 r682WB 1ch, 16dc, swap, 13dc, swap, 8dc, swap, 4dc, swap, 9dc
 r683WB 1ch, 9dc, swap, 4dc, swap, 8dc, swap, 12dc, swap, 17dc
 r684WB 1ch, 18dc, swap, 10dc, swap, 8dc, swap, 4dc, swap, 10dc
 r685WB 1ch, 11dc, swap, 4dc, swap, 8dc, swap, 8dc, swap, 19dc
 r686WB 1ch, 21dc, swap, 4dc, swap, 10dc, swap, 3dc, swap, 12dc

-----end of 6

r687WB 1ch, work 50dc to end
 r688WB 1ch, work 50dc to end
 r689WB 1ch, work 50dc to end
 r690WB 1ch, work 50dc to end
 r691WB 1ch, work 50dc to end

Completing the scarf

The two open ends of the scarf are joined by using a version of a decrease stitch between the pairs of white and black stitches, as described below.

White surface on top.

With the white wool, 1ch. [Crochet hook into first white stitch, wool over crochet hook and pull the wool through. This gives two loops on the crochet hook. Crochet hook into first black stitch, wool over crochet hook and pull the wool through. This gives three loops on the crochet hook. Wool over crochet hook and pull through the three loops on the crochet hook, leaving just one.]

Repeat [.....] for each pair of white and black stitches to the end of the row.

The edges along the length of the scarf are joined by matching up the white and black edge stitches and then working a dc through both edge stitches using a 2.5mm hook

The picture shows a section of the edging. The safety pin was used to secure the current stitch while the photograph was taken.



White thread was used to join the one edge and the black thread for the other edge.

The ends of the edging threads were then sewn into the scarf.

Symbol charts























