Squaring using Yavadunum Method

The Yavadunum Method is used for squaring numbers that are close to the base or sub-base. We use the sub-sutra "yavadunum tavdunikritya vargamcha yojayet" which means:
"whatever the extent of the deficiency of a number from the base, lessen that number to the same extent and then set up the square of the deficiency".
Although the sub-sutra speaks about a deficiency it can be applied equally well when dealing with a surplus. In this case, the surplus, or excess, is added to the same extent and then this is followed by the square of the surplus. So, whatever the deviation from the base, increase the number by the deviation and then postfix the square of the deviation.

In a nutshell, squaring of numbers near the base involves two steps.
Step 1:
The LHS of the answer is simply the number itself plus the deviation.
As mentioned previously, the deviation may be negative (deficiency) or positive (surplus) depending on whether the number is, respectively, less than or more than the base.

Step 2:
The RHS is simply the square of the deviation.
The RHS of the answer contains the same number of digits as the number of zeroes in the base.
Please note that:

- If there are excess digits on the RHS, those excess digits are carried over to the LHS.
- If there are deficit digits on the RHS, an appropriate number of zeroes are placed to the left of the RHS answer part to make up the deficit.

eg.(1) $96^2 = (96 + \bar{4}) / (\bar{4})^2 = (92) / 16 = 9216$

eg.(2) $107^2 = (107 + 7) / (7)^2 = (114) / 49 = 11449$

eg.(3) $992^2 = (992 + 00\bar{8}) / (00\bar{8})^2 = (984) / 064 = 984064$

eg.(4) $113^2 = (113 + 13) / (13)^2 = (126) / {}_{1}69 = 12769$

If the number to be squared is not close to the base but happens to be near to a sub-base (a.k.a working-base) we can use this sub-base for the practical calculation and find the deviation from it. The LHS is the proportionately modified, as in the case of multiplication using a sub-base.
(Please refer to Nikhilam Multiplication Section, Part 2 to refresh your memory).

Let's see some examples...

e.g(5) 37^2				
		Using base = 10 & sub-base = 30		
=		$3\,(37 + 7)$	/	7^2
=		3×44	/	${}_{4}9$
=		132	/	${}_{4}9$
=		1369		

eg.(6) 48^2

Using base = 10 & sub-base = 50

$= 5(48 + \overline{2}) \;/\; (\overline{2})^2$

$= 5 \times 46 \;/\; 4$

$= 230 \;/\; 4$

$= 2304$

Alternatively......

Using base = 100 & sub-base = 50

$= \frac{1}{2} \times (48 + 0\overline{2}) \;/\; (0\overline{2})^2$

$= \frac{1}{2} \times (46) \;/\; 04$

$= 23 \;/\; 04$

$= 2304$

eg.(7) 809^2

Using base = 100 & sub-base = 800

$= 8\,(809 + 09) \;/\; (09)^2$

$= 8 \times 818 \;/\; 81$

$= 6544 \;/\; 81$

$= 654481$

eg.(8) 674^2

Using base = 100 & sub-base = 700

$= 7\,(674 + \overline{26}) \;/\; (\overline{26})^2$

$= 7 \times 648 \;/\; {}_{6}76$

$= 4536 \;/\; {}_{6}76$

$= 454276$

But $(\overline{26})^2 = (26)^2$

Using base = 10 & sub-base = 20

$2(26 + 6) \;/\; 6^2$

$= 2 \times 32 \;/\; {}_{3}6$

$= 64 \;/\; {}_{3}6$

$= 676$

eg.(9) 30035^2

Using base = 10000 & sub-base = 30000

$= 3\,(30035 + 35) \;/\; (35)^2$

$= 3 \times 30070 \;/\; 1225$

$= 90210 \;/\; 1225$

$= 902101225$

Using Ekadhika Squaring of $(35)^2$

$= (3 \times 4) \;/\; 25$

$= 1225$

eg.(10) 6987^2

Using base = 1000 & sub-base = 7000

$= 7\,(6987 + \overline{13}) \;/\; (\overline{13})^2$

$= 7 \times 6974 \;/\; 169$

$= 48818 \;/\; 169$

$= 48818169$