

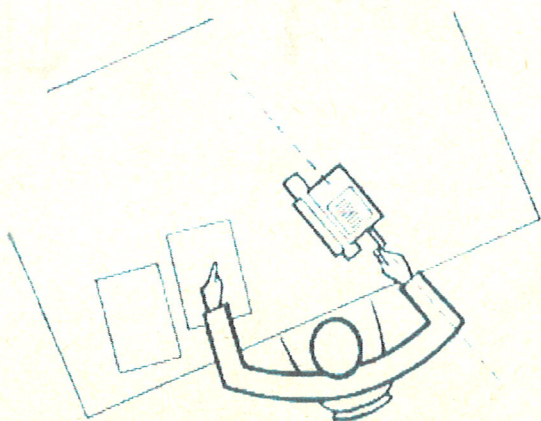
WASC 1995

Instruction Booklets
for Brunsviga and
Odner Calculating
Machines
(scanned)

Brunsviga 15 ??

INSTRUCTION BOOK

1 Operation of the machine



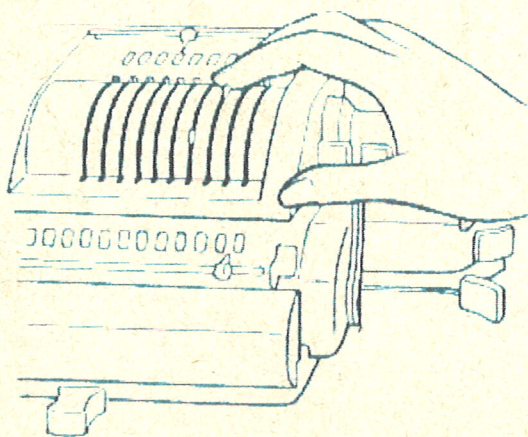
The Brunsviga 13 RM, your new Calculating Machine, stands before you. You have just unpacked it, and now you wish to get to know the machine and how to operate it as quickly as possible.

The Brunsviga 13 RM is immediately ready for operation; you can start.

Please place the machine on the right in front of you in such a manner that you can turn the crank comfortably and also have a clear view of all the 3 registers.

The operating handle is drawn out a little from its rest, after which you turn the handle a few times to the right and a few times to the left for practice, without, however, letting it go back into the rest after each turn. All crank rotations should be made quickly and evenly avoiding sudden jerks. Once you have commenced to turn the handle, the revolution must be completed, i.e. you cannot reverse the direction of rotation in the middle of a revolution.

2 Setting levers and check register

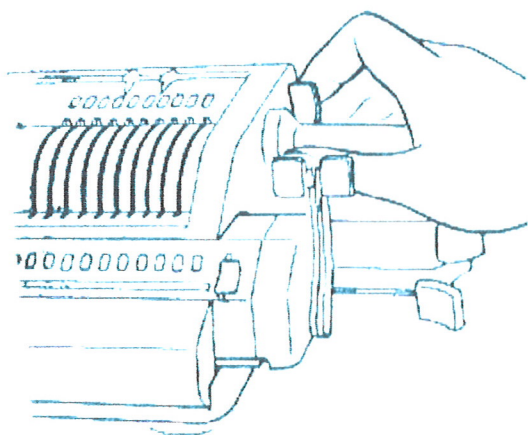


The number is set by means of the levers in the setting mechanism. You will see that the setting track of each of the levers is marked with the numbers 1 -- 9.

If you, therefore, wish to set any number, e.g. «5» you draw the lever up to the embossed «5». You will notice that the «5» also appears in the check register after setting. In the case of multiple digit values it is of most advantage to put the figures into the machine starting from the left and beginning with the first digit, i.e. for instance in the case of the 5-digit number 27354, the 5th lever is first of all set to «2», (the setting levers are numbered by means of the digit numbers above the setting control mechanism), then the 4th lever is set to «7», the 3rd lever to «3», the 2nd lever to «5» and the 1st lever to «4». Now as a control, the number «27354» can be read off from the check register.

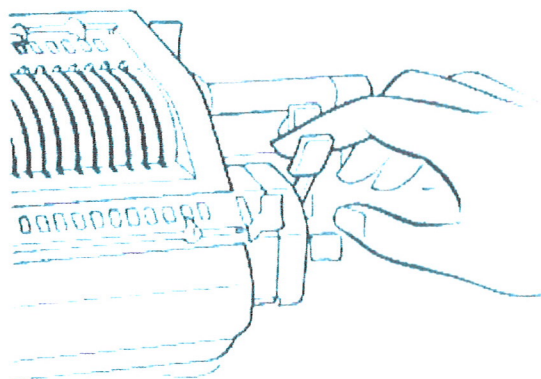
Please practice a little with any arbitrary numbers.

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3 Cancelling out of the setting mechanism

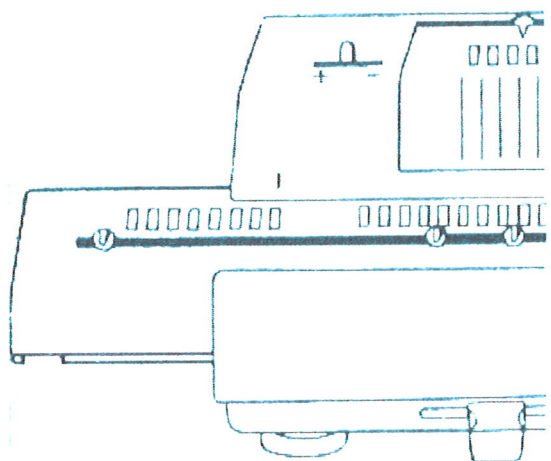
The setting mechanism and, with it, simultaneously the check register can be cancelled out by pulling the cancellation lever from back to front and then releasing it again.



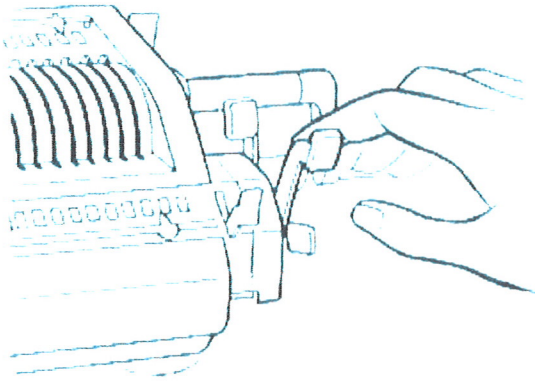
4 The product register

Now you will have to get to know the product register. This is located in the right-hand portion of the carriage and has a capacity of 13 digits. The separate digits are marked, as in the setting mechanism, by means of small consecutively running figures from the right to the left. The product register is cancelled out, (i.e. brought back to zero) by pulling the left-hand cancellation lever to the front and then releasing it again.

5 The multiplier register with tens transmission

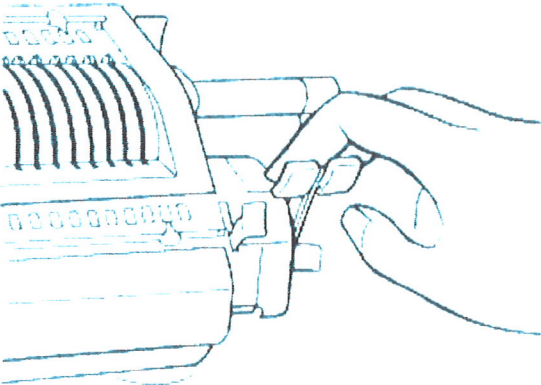


The purpose of the multiplier register is to count the revolutions of the operating handle. It is located in the left-hand portion of the carriage. As in all the other mechanisms the 8 digits are marked by numbers; each of the markings indicates the position of the carriage in this particular case. The multiplier register of the 13 RM is also equipped with a reversing gear which enables optional counter-rotation. The shift lever can occupy 3 positions: plus-neutral-minus. Its basic position is at neutral and corresponding to the first rotation of the operating handle it is set to either «+» or «-». Once the lever is in one of these positions it will remain there until you return the counter to zero, when it will again go to the central position. Normally, you need not touch this reversing lever as it functions automatically, but if you wish to change the direction of rotation of the counter wheels, you may move it by hand; always remembering to see first of all that the handle is in its neutral position. This reversing lever has many uses, as by using this mechanism, both the product and counter registers can react either positively or negatively simultaneously, or in opposite directions.



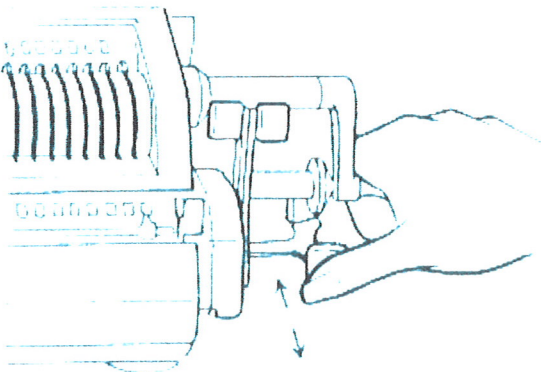
6 Cancellation of the multiplier register

The multiplier register is cancelled out by means of the right-hand cancellation lever. This is pulled to the front and then released. The counter will then be set to «zero» and the shift lever is again in «neutral».



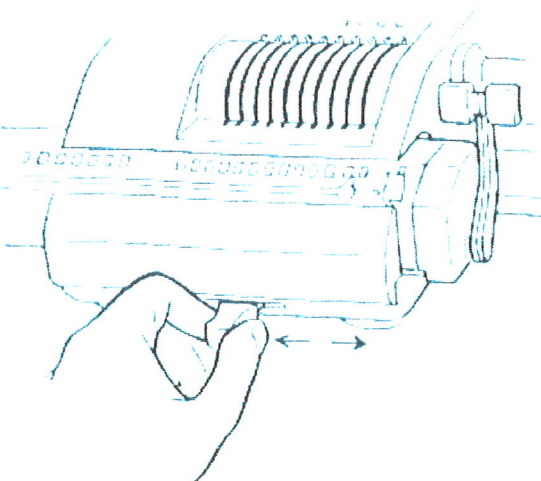
7 Combined cancellation

The cancellation levers for the product register and for the multiplier register have been designed in such a manner that they can be operated by a combination grip with 2 fingers (best results are achieved if forefinger and middle finger are used), thus producing a combined cancellation. Thus, both registers can be cancelled out with one movement only.



8 Step-by-step tabulating

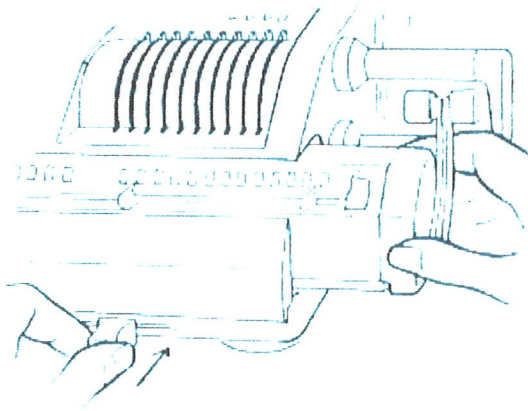
Below the operating handle there is a shift rocker arm, arranged as a double handle and by means of which the carriage can be moved step-by-step into the required calculating position. This rocker arm enables the operation of the machine to be carried out with one hand only.



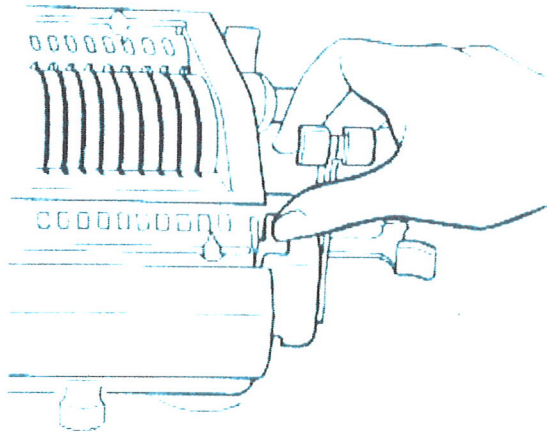
9 Tabulating step-by-step or intermittently

The shift-key attached to the front of the machine offers another possibility of moving the carriage to the required calculating position. The shift-key can be moved to the right or to the left. When doing so, the carriage will always move one position in the same direction.

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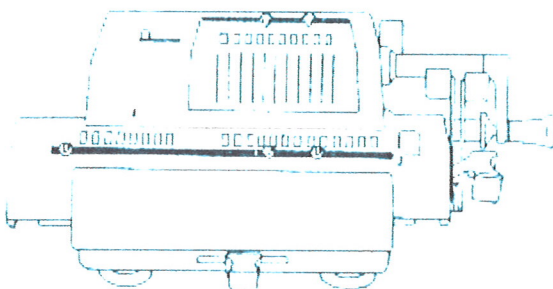


This key can also be pressed in, so that the carriage is then released. It can then be moved by any number of positions.



10 Back transfer with one hand

The Brunsviga 13 RM also possesses back-transfer equipment by means of which results can be transferred back to the setting mechanism. For this purpose the setting mechanism is cancelled out, the retransfer lever (front right on carriage) is shifted upwards and then the product register is cancelled out. The value from the product register is now automatically set in the setting mechanism, ready to use for the next calculation.



11 Decimal point slide bar and reading of value

All three registers of the Brunsviga 13 RM are equipped with decimal point rails, on to which are attached decimal point indicators. These can be pushed to any required position in order to facilitate the reading off of the value.

Calculating the 4 basic kinds of calculation

Calculating the 4 basic kinds of calculation on the Brunsviga calculating machine is done as variations of digit setting, carriage tabulation, operating handle rotation, reading of values and cancellation.

The procedure of the most important calculating work is briefly shown in the following practical numerical examples.

Directions for 10 calculating problems

1 Addition

Problem: $17 + 31 + 58 = 106$

Basic position
 Lever 2:1
 Lever 1:7
 One + turn
 Cancellation lever setting mechanism
 Lever 2:3
 Lever 1:1
 One + turn
 Cancellation lever setting mechanism
 Lever 2:5
 Lever 1:8
 One + turn

2 Subtraction

Problem : $23 - 17 = 6$

Basic position
 Lever 2:2
 Lever 1:3
 One + turn
 Cancellation lever setting mechanism
 Lever 2:1
 Lever 1:7
 One - turn

3 Subtraction below zero

Problem : $12 - 14 = -2$

Basic position
 Set 12 (levers 2 -- 1)
 One + turn
 Cancellation lever setting mechanism
 Set 14 (levers 2 -- 1)
 One - turn
 Cancellation lever setting mechanism
 Retransfer lever
 Cancellation lever product register
 One - turn

next

4 Multiplication

Problem $13 \times 12 = 156$

Set 13 (levers 2 -- 1)
Carriage position 2
One + turn
Basic position
Two + turns

5 Shortened multiplication

Problem: $54 \times 98 = 5292$

Set 54 (levers 2 -- 1)
Carriage position 3
One + turn
Basic position
Two - turns

6 Multiple multiplication

Problem: $21 \times 89 \times 124 = 231756$

Set 21 (levers 2 -- 1)
Carriage position 3
One + turn
Carriage position
One - turn
Basic position
One - turn
Cancellation lever setting mechanism
Retransfer lever
Combined cancellation multiplier register and product register
Carriage position 3
One + turn
Carriage position 2
Two + turns
Basic position
Four + turns

[next](#)

7 Accumulation of products

Problem: $(379 \times 15.4) + (67 \times 21.3) = 7263.7$

Set 379 (levers 3 -- 1)
 Carriage position 3
 One + turn
 Carriage position 2
 Five + turns
 Basic position
 Four + turns
 Cancel setting and multiplier registers
 Set 67 (levers 2 -- 1)
 Carriage position 3
 Two + turns
 Carriage position 2
 One + turn
 Basic position
 Three + turns

8 Differences of products

Problem: $(6349 \times 213) - (4127 \times 109) = 902494$

Set 6349 (levers 4 -- 1)
 Carriage position 3
 Two + turns
 Carriage position 2
 One + turn
 Basic position
 Three + turns
 Cancel setting and multiplier registers
 Set 4127 (levers 4 -- 1)
 Carriage position 3
 One - turn
 Carriage position 2
 One - turn
 Basic position
 One + turn

next

9 Division by subtraction (tear-down division)

Problem : 645372 :2758 = 234

Set 645372 (levers 6 -- 1)
Carriage position 8
One + turn
Cancel setting and multiplier registers
Set 2758 (levers 6 -- 3)
Three -- turns (bell signal)
One + turn
Carriage position 7
Four -- turns (bell signal)
One + turn
Carriage position 6
Five -- turns (bell signal)
One + turn

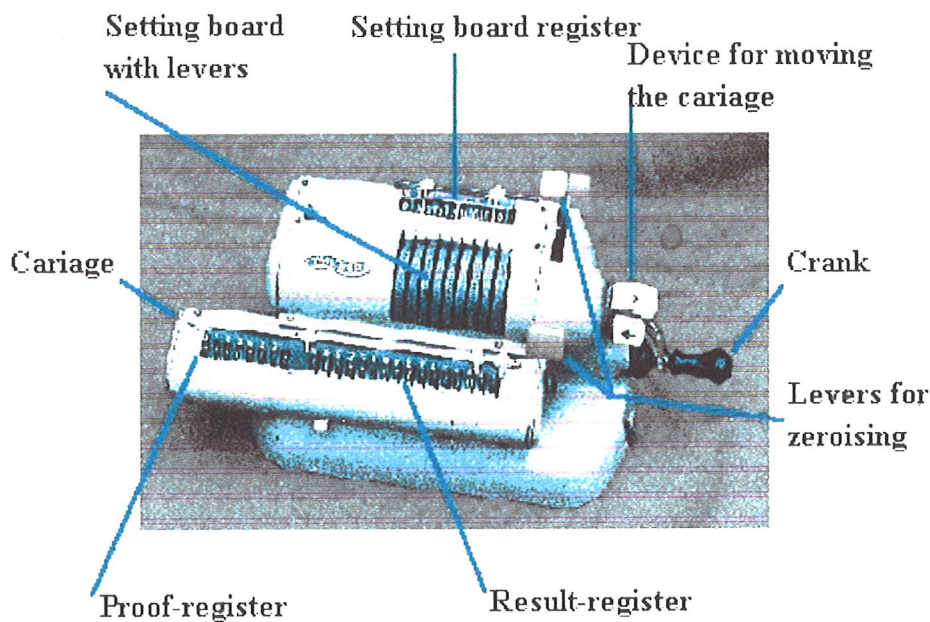
10 Division by addition (build up division)

Problem : 30336 :237 = 128

Set 237 (levers 3 -- 1)
Carriage position 8
One + turn
Carriage position 7
Three + turns
Carriage position 6
Two -- turns

next

Calculations with a calculator of the pin wheel (Odhner) type.



Addition

The first number is entered into the setting-board. By means of a positive turn of the crank this value is transported to the result-register. In the same way we can add a second number to the value in the result-register.

Example: $85607 + 439 = ?$

1. Zeroise all registers.
2. Carriage in extreme left position.
3. Set the first number 85607 with the setting board (positions 5-1)
4. Enter this number into the result-register by means of a positive turn on the crank.
5. Zeroise levers (setting-board).
6. Set the second number 439 (3-1).
7. Add this number by means of a positive turn on the crank.
8. Read the result 86046.

Substraction

A number can be subtracted by means of a negative turn of the crank at step 7 of the addition. If a subtraction should give a negative number, then the result is the arithmetical complement of this negative number.

For example -2 is indicated as 99999998.

Multiplication

A multiplication can be carried out by repeated addition. For example $3 * 2 = 2 + 2 + 2 = 6$. With multiplication with larger numbers (for example $123 * 234$) is not needed to turn around the crank 123 times. For this multiplications we can split the calculation by using the carriage as $3 * 234 + 20 * 234 + 100 * 234 = 234 + 234 + 234 + 2340 + 2340 + 23400$. example: $123 * 234$

1. Zeroise all registers.
2. Carriage in extreme left position, thus the 1th position.
3. Set the number 234 with the setting board (positions 3-1)
4. Turn around the crank three times ($234 + 234 + 234$).
5. Move the carriage one step to the right, thus to 2th position.
6. Turn around the crank two times ($+ 2340 + 2340$).
7. Move the carriage one step to the right, thus to 3th position.
8. Turn around the crank one times ($+ 23400$).
9. Read the result 28782.

Division (with arithmetical complement in the Results-register

The dividend is entered into the result-register by means of a negative turn of the crank, so that the mechanical complement appears. After the divisor is set on the levers, the figures in the result-register are evened out to zero by means of possitive turns.
Example: $85607 : 439 = ?$

1. Zeroise all registers.
2. Carriage in extreme right position.
3. Set the dividend 85607 (positions 6-2)
4. Enter the dividend into the result-register by means of a negative turn on the crank.
5. Zeroise levers and proof-register.
6. Set the divisor 439 (6-4).
7. Make positive turns - observing the bell, which warns for turns in excess, and moving the carriage step by step to the left - until the figures in the result-register are as close to zero possible. Make consequently 1 (8), 9 (7), 5 (6), 4 (3), 5 (2), and 5 (1) positive turns.
8. Read the result 195.00455.

Square roots

The mechanical method of finding square roots is based on the following formula:

$$1 + 3 + 5 + 7 + 9 + 11 + \dots + (2n-3) + (2n-1) = n^2$$

Example: $\text{SQRT}(966289) = 983$

1. Zeroise all registers.
2. Enter 966289 in dials 13-8 of the result-register.
 1. Zeroise the proof-register.
 2. Zeroise the levers.
 3. Divide by the decimal points 966289 in groups of 2 figures each starting from the right, (by decimal

figures start from the left i.e. from the decimal point).

4. Carriage in 8th position.
3. Set the 5th lever at 1, and subtract it by means of a negative turn from the left hand group 96. Move the same lever to 3, and then to 5, 7, 9, 11 (5th and 6th lever), 13, 15, 17 and 19, and each time you make one negative turn. When you make the turn with 19 on the levers the bell will ring. Make therefore a positive turn. Reduce the number set on the levers by one unit, thus to 18.
4. Move the carriage one step, thus to 7th position. Set the fourth lever at 1, and subtract successively 181, 183, 187, 189, 191, 193, 195, 197. At the last subtraction the bell will ring. Make therefore a positive turn. Reduce the number by one unit, thus to 196.
5. Move the carriage one step, thus to 6th position. Subtract successively 1961, 1963 and 1965. After the last subtraction the result-register shows 0. The proof-register shows the square root 983.

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