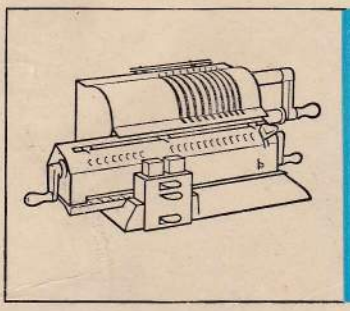


Multiply and divide on an Original-Odhner

ORIGINAL-ODHNER

"The machine to count on"

MULTIPLY AND DIVIDE ON AN ORIGINAL-ODHNER

Hints on calculations
with calculating machines

Issued by
AKTIEBOLAGET ORIGINAL-ODHNER
Gothenburg, Sweden

CONTENTS

Have your machine beside you whilst you study these instructions. Try to discuss existing calculating problems and methods with an experienced Odhner operator.

Odhner calculations easy to learn

This brief instruction book on how to use the Odhner calculating machine introduces to you a helpful and willing assistant from which you will get good and faithful service at all times. And — what's more — if you ever thought that mathematical calculations are "dry and tedious", you will soon find that this is not the case if you use an Odhner calculator. With the assistance of an Original-Odhner your work will improve and, at the same time, will get more interesting.

It is extremely easy to learn to calculate with an Odhner and it does not take long to master the first essentials. After that you will discover a number of short cuts and easy methods which will facilitate your work no end. Whatever you do, don't look upon your new assistant as just a robot or a mechanical instrument with a strictly limited field of action. Get to know your machine thoroughly, study its method of working and the possibilities it offers. In this way you will get full value and the best service from your new acquaintance.

ORIGINAL-ODHNER

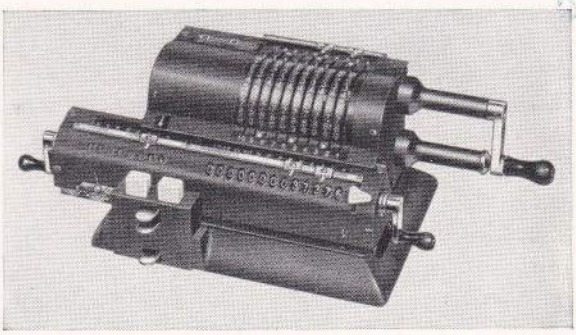
A machine to count on

The various problems for calculations differ greatly with the branch of industry in which you may be engaged. The business man has not the same kind of calculations to work out as the architect for instance. The sums to be worked by a cashier vary from those of an engineer. But in all branches of commerce, trade and industry, in all offices and workshops — even privately at home — an Original-Odhner is invaluable. The calculating machines of the Original-Odhner brand are made in the following five types:

Model 127
This is the standard type. Like all the others it is fitted with a back transfer device which greatly facilitates all calculations, particularly those of progressive multiplication.

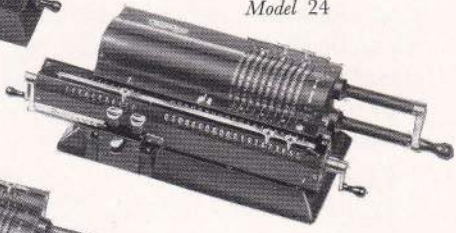
Model 129
In addition to a back transfer device, this model has tens transmission in the proof register for facilitating certain calculations of multiplication etc.

Model 24
This type is similar to model 129, that is to say, it is fitted with a back transfer device and tens transmission in the proof register, but it has a considerably larger capacity (10 dials on the setting board, 11 dials in the proof register and 20 dials in the result register) and is therefore particularly suitable for calculations involving a large number of digits, as well as compound reckoning.

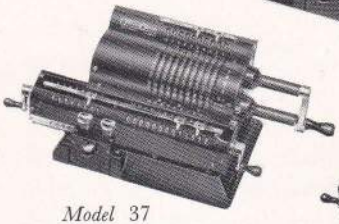


Model 127

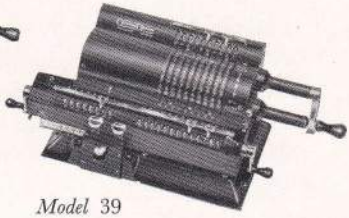
Model 129



Model 24



Model 37



Model 39

Model 37

In addition to the back transfer device, this type is supplied with a control register for reading off the number set in a horizontal line.

Model 39

Back transfer device, tens transmission and control register, characterize this particular machine.

Get to know your machine

The setting board (1)
This is where you start all calculations. Ten numbered setting levers are provided for the convenient setting of any combination of figures.

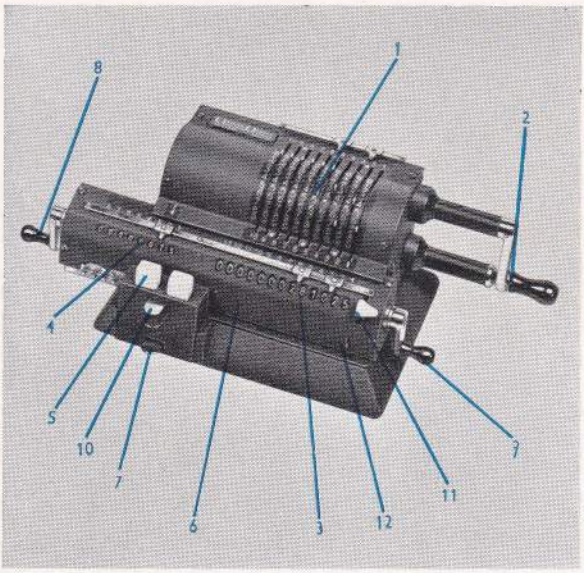
The handle or crank (2)
With its aid the actual work of calculation is performed. Turning the handle clockwise (positive or plus turns) causes the figures shown on the setting board to be transferred to the result register in a positive manner, but turning it in an anti-clockwise direction (negative or minus turns) will transfer the figures negatively.

The result register (3)
The combination of figures transferred from the setting board are recorded in this register. Thirteen numbered apertures faithfully register any combination of 13 digits. An even larger capacity is offered by model 24 which is capable of registering numbers comprising 20 digits.

The proof register (4)
This records the number of positive or negative turns completed with the handle. White figures indicate plus or positive turns and red figures minus or negative turns. In machines fitted with tens transmission, however, there are white figures only. This register has a total of eight — eleven on model 24 — consecutively numbered apertures.

The tabulator (5)
The two cube shaped keys on the front of the machine are provided to move *the carriage* (6), a step at a time to the right or left.

The carriage release (7)
When this is depressed, the carriage can be moved to the right or left as required. On models 37, 39 and 24 the release is placed where the model illustrated has the zero setting device for the setting board. (10).



Zero setting device for the proof register (8)
This causes the proof register to be cleared of figures.

Zero setting device for the result register (9)
Provided to clear the result register.

Zero setting device for the setting board (10)
Keeping this depressed while turning the handle a quarter turn clockwise (plus turn) you will clear the setting board. Please note that this device will be found on the right side of the machine on models 37, 39 and 24.

Back transfer device (11)
After having cleared the setting board, depress the back transfer key. If you then clear the result register, the combination of figures in the machine is transferred to the setting board. Should you happen to depress the back transfer key in error, you can release it by pressing down the metal lever (12) projecting below this key.

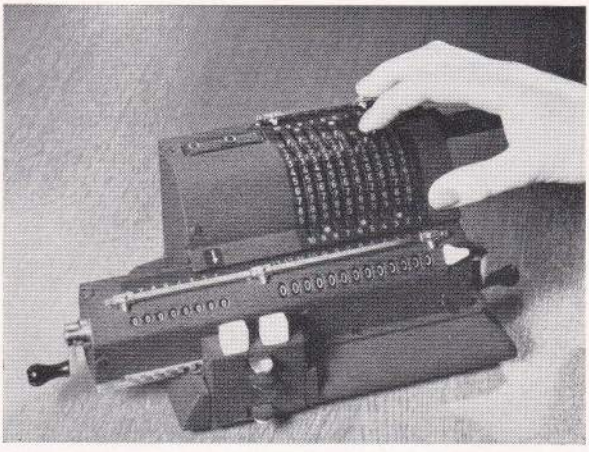
The Original-Odhner calculator takes up very little space and is easy to manipulate. Take great care to place the machine in the most suitable way for operation. You will then sit comfortably and will not tire so soon.

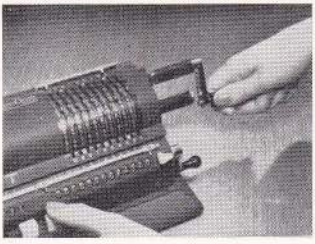
Let the machine do the work for you

Correct positioning of the machine will greatly facilitate your work. Look at the picture of the young lady. Her machine is so placed that the handle and setting board are easily accessible to her right hand. At the same time, she has a good view of all the various registers of the machine. You should, therefore, place your machine in such a manner that its axis is parallel with your right under-arm.

CORRECT MANIPULATION

All setting of figures should be done with the fore-finger of the right hand, as shown in the illustration below.

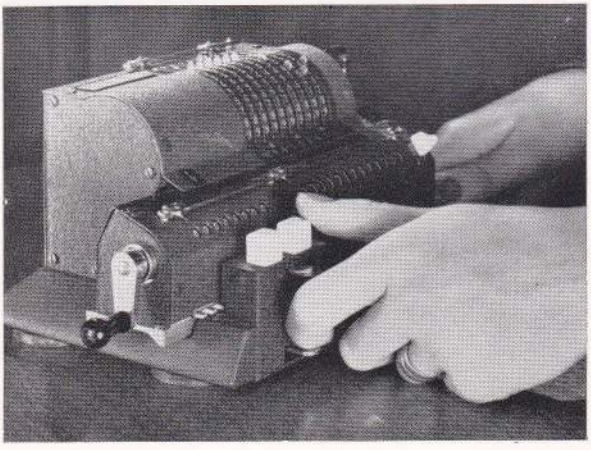




The *handle* is turned with the thumb and forefinger in such a manner that the bent finger and thumb grip the handle of the crank on either side.

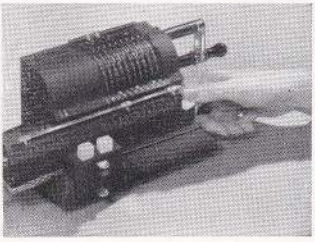
A step by step movement of *the carriage* is accomplished by depressing the left or right hand tabulator key with your thumb. The tabulator is manipulated with your left hand in the manner shown in the illustration.

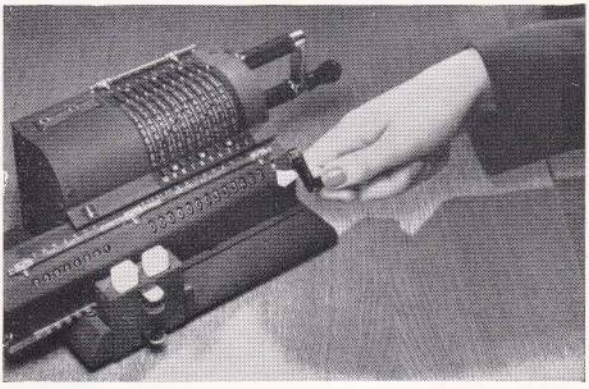
The *carriage release* is depressed with the forefinger of your left hand while the carriage is then pushed with your right hand gripping the zero setting device of the result register.



Both hands are used for clearing the setting board. The zero setting device is kept depressed with the thumb of your left hand while a quarter turn is made with the main crank handle.

The back transfer device is most conveniently operated with the thumb of your right hand. Please note that the back transfer key can only be depressed if the setting board has been cleared of figures.





The result and proof registers are cleared by giving the right hand and left hand zero setting handles one complete turn.

A model 127 Original-Odhner contains not less than 1000 parts. The machine is a precision instrument of the highest quality.

The four rules of arithmetic

It is now time for the fundamental exercises with the machine. You will have the machine in front of you, and so positioned that all the operating parts are within easy reach. In order to save space we have, in the following text, made use of certain abbreviations. The setting board is thus abbreviated to S.B.; the proof register to P.R. and the result register to R.R.

(+) ADDITION

Addendum + addendum = total

Example: 456 + 579 = 1035

First of all make sure that all the registers are cleared, and that the carriage is set in its normal position (as far as it will go towards the left). Now set up 456 on the S.B. (setting board) by pushing lever 3 down to 4, lever 2 to 5 and lever 1 to 6. The setting levers are numbered from 1—10. If, in the continuation, a number containing three digits is to be set up to the right of the S.B. we will indicate this by using the digits (3—1), but if it is to be set up to the left, we will be using digits 10—8. Now make one plus turn with the handle and you will find that R.R. (result register) shows figures . . . 00456 and that, therefore, the combination of figures in the S.B. has been transferred here. Now clear the S.B. but do not interfere with R.R. or P.R. Set up the second group of figures, 579 (3—1), and make another positive turn with the handle. The number set up, 579, is then transferred and added to the previously transferred figure combination, giving as result of the addition the sum of 1035.

Progressive addition

Example: 125 + 125 + 125 = 375

As usual, check that all the registers are clear of figures and that the carriage is in normal position.

Set up the number 125 tot the extreme right on

the S.B. (3—1) and make three consecutive plus turns with the handle. For each revolution you will find that the R.R. increases by 125 and after the third turn it will show the required sum, 375.

(—) SUBTRACTION

Minuend — subtrahend = remainder

Example: 987 — 654 = 333

Make sure the registers are clear and the carriage in normal position. Now set up the minuend, 987 on the S.B. (3—1) and make one plus turn in order to transfer it to the R.R. which will now show . . .00987. Clear the S.B. but leave the R.R. and P.R. alone. Then set up the subtrahend, 654 to the extreme right of the S.B. (3—1) and make one negative turn (anticlockwise). The number in the R.R. . . . 00987 will then be reduced by 654, leaving the required remainder, 333.

Progressive subtraction

Example: 2345—125—125—125—125=1845

All registers should be clear and the carriage in normal position. First you set up the minued, 2345 (4—1) and transfer it to the R.R. by a plus turn. This register will then show 002345. Clear the S.B. but leave the R.R. and P.R. Now set up the subtrahend 125 and make 4 complete minus turns with the handle. For each turn the number in the R.R. will be reduced by 125 or in all 500, and as a result you will have the figures 1845, which is the number required.

By the time you have got this far you will probably think that these calculations could have been done much quicker and simpler on the Odhner adding machine. You are right — a calculator is not primarily intended for addition and subtraction, but for calculations involving multiplication and division of the type you have need to solve almost daily.

(×) MULTIPLICATION

Multiplier × multiplicand = product

Example: $123 \times 456 = 56088$

In carrying out this multiplication with the aid of "pen and paper" you simply add up portions 3×456, 20×456 and 100×456, in which case you make use of the method:

456			
× 123			
1368	=	the portions of the product	3×456
912(0)	=	,, ,, ,, ,, ,,	20×456
456(00)	=	,, ,, ,, ,, ,,	100×456
56088			

Calculating this on an Original-Odhner you proceed in exactly the same manner:

After checking that the registers are clear and the carriage set in normal position, you set up the multiplicand, 456, to the extreme right of the S.B. (3—1).

You then make 3 plus turns which will bring the product $3 \times 456 = 1368$ into the R.R. You now move the carriage 1 step to the right and turn the handle twice, by which you multiply 456 by 20 (and not by 2), and this portion of the entire product, 9120, is automatically added to the number previously set in the R.R. so that the result now shows as 10488.

Another step to the right with the carriage and a further plus turn with the handle will add to the R.R. total the portion of the product of 100×456 and give the complete answer, 56088, as shown in the R.R. In the P.R. you can read off the orginal multiplier, the figure 123.

Example: $234.5 \times 119.43 = 28006.335$

Set up the multiplier, 119.43 on the S.B. (5—1) and position the right hand decimal indicator, which is to be found above the S.B. so that it points to the correct place of decimal, e.g. between the second and third setting tracks.

Carry out the multiplication in the usual way. You start with 5 plus turns and move the carriage step by step to the right, whilst between each step you turn the handle the number of times corresponding to the figure indicated by the multiplicand, 234.5. Position the decimal indicator above the P.R. between the first and second apertures so that this register shows 234.5. Now add together the number of decimals in the P.R. and S.B. There is one decimal in the P.R. and two on the S.B. thus in all 3 decimals. Set the decimal indicator above the R.R. 3 steps from the right, that is, between the third and fourth apertures. The R.R. then shows the correct product 28006.335.

Rule: ***The number of decimals in the R.R. when multiplying fractions, must equal the total number of decimals shown in the P.R. and S.B.***

Short cuts in multiplication

On many occasions it is possible to save considerable time by carrying out a multiplication in the form of a combination of repeated addition and subtraction. This is always the case when one or more of the digits of the multiplier is higher than 6.

Example: $99 \times 456 = 45144$

Note that the multiplier, 99, equals 100—1, and that the multiplication could also be recorded thus: $(100—1) \times 345 = 100 \times 456 — 1 \times 456 = ?$

First of all clear all registers and make sure that the carriage is in normal position.

Now set the multiplicand, 456 on the S.B. (3—1) and multiply first by 100 by moving the carriage two steps to the right and turning the handle once. The R.R. then shows 45600. Move the carriage two steps back to the left and reduce the amount by 1×456 by making a minus turn with the handle. The R.R. now shows the product you want, 45144. The P.R. shows 101 (the unit figure in red) which is equal to $100—1 = 99$. On machines provided with

tens transmission the proof register will show 99.

Progressive multiplication

Example: $456 \times 345 \times 234 = 36812880$

Once you have assured yourself that the registers are clear and the carriage in normal position, you set up the multiplicand 456 (3—1) and multiply in the usual way by 345. The R.R. will then show 157320 and the P.R. 345. Now clear the P.R. and S.B. and bring carriage back to normal position. Depress the back transfer key and clear the R.R. The number, 157320, is thereby transferred to the S.B. If you then multiply again by 234, the P.R. will show 234 and the R.R. 36812880 which is the desired result.

(÷) DIVISION

$$\frac{\text{Dividend}}{\text{Divisor}} = \text{quotient}$$

Example: $\frac{3125}{25} = 125$

Have you ever thought of what is actually happening when you are working out a division? With the aid of the divisor as a subtrahend you are simply attempting to subtract away the dividend or, in other words you try to find how many times the divisor "goes" into the dividend. This infers that you will have to reduce the dividend above by 25 altogether 125 times before the dividend is entirely "subtracted away".

This principle also applies when you work out divisions with the aid of the Original-Odhner. Via the S.B. the dividend is transferred to the R.R. After having cleared the S.B., the divisor is set up, and you endeavour to "empty" the R.R. by repeated negative turns with the handle. The P.R. records the number of turns you make, and in this register you can also read off the desired result.

We will make an attempt to solve the example quoted above.

First clear all registers as usual and set the car-

riage as far as it will go to the right. Then set up the dividend, 3125 (6—3). Transfer the dividend to the R.R. by a single positive turn of the handle and then clear the P.R. and S.B. *Do not forget to remove the digit 1 which appeared in the P.R. when you transferred the dividend.* Now set up the divisor, 25, on the S.B. in such a manner that the 2 of the divisor comes immediately above the 3 of the dividend in the R.R. and the 5 of the divisor directly above the 1 of the dividend (6—5).

The S.B. now shows 000025.0000
and the R.R. 3125.000000000

Now make two minus turns, which means that you reduce the two first figures of the dividend, 31, by 2×25. On the second minus turn you will have heard the sound of a bell placed inside the machine and this bell signal indicates that the number in the R.R. has been transformed from a positive number to a negative one. You apparently made one minus turn too many and this has to be compensated for by a plus turn.

The P.R. will now show 10000000 and the R.R. 0625.0000000000. Move the carriage one step to the left and give the handle 3 minus turns. The last turn caused the bell to ring. You therefore overstepped the limit and have to make amends by giving the handle a positive turn, This will cause the P.R. to show 12000000 and the P.R. 012500000000.

Move the carriage one more step to the left and turn the handle backwards (minus turns) 6 times. The sound of the bell on the last turn tells you to go back once, i.e. make one plus turn, whereupon the P.R. shows 12500000, whereas the R.R. has been entirely cleared. The number of decimals in the R.R. is 9 and on the S.B. 4. The difference between these two figures (9—4) = 5 and this indicates the correct number of decimals in the P.R. You, therefore, set the decimal indicator of the P.R. 5 steps from the right, which places it between the 5th and

6th apertures, when the P.R. then shows the desired quotient, 125.

Rule: ***For division, the number of decimals in the P.R. must equal the difference between the number of decimals of the R.R. and the S.B.***

We will try yet another example:

Example: $\frac{13579}{5432} = 2.4998159$

Clear all registers and set the carriage as far as it will go to the right.

Set up the dividend on the S.B. (6—2) and transfer it to the R.R. by means of a plus turn of the handle.

Clear the P.R. and the S.B. but leave the R.R. alone.

Set up the divisor on the S.B. (5—2) so that the 5 comes above the 3 of the dividend, the 4 of the divisor above the 5 of the dividend and so on when, finally, the S.B. will show:

000005432.0

and the R.R. 13579.000000000.

Do not forget to put the decimal indicators in their correct places.

Now make 3 minus turns. On the third turn you will have heard the bell and you will therefore have to make one plus turn. The P.R. then shows 20000000 and the R.R. 02715.00000000. Move the carriage one step to the left and take 5 minus turns with the handle. The bell will sound on the 5th turn, and you will, therefore, take one positive turn to compensate. The P.R. now shows 24000000 and the R.R. 00542.20000000. You move the carriage yet one more step to the left and turn the handle negatively 10 times, followed by a positive turn.

The P.R. then shows 24900000 and the R.R. 00053.32000000. Keep on moving the carriage to the left, and between each step carry out as many

negative turns as required until you hear the sound of the bell, when you immediately make one plus turn. After the last operation the P.R. will show 24998159. At the same time the P.R. shows 00000.00003120 which is all that remains of the originally set up dividend, 13579, and we can hardly come nearer to a completely emptied R.R. than this.

The number of decimals of the R.R. is 8 and that of the S.B. is 1. The difference between the two figures (8—1)=7, and we therefore "divide off" 7 decimals in the P.R. thus leaving the result 2.4998159 which is our answer.

You see how simple it is to divide on an Original-Odhner. It is possible that the setting up the divisor on the S.B. may have puzzled you somewhat, but there is no mystery about it. In order to obtain as many definite decimals as possible in the quotient we must let it "grow" as far to the left of the P.R. as we can and, consequently, the carriage should be set as far to the right as we can get before starting to turn the handle.

The object of the entire operation is to "empty" the R.R. by repeated minus turns of the handle and, obviously, we start with the emptying process from the left to the right. The divisor should be set up in such a manner that the first minus turn will remove as many as possible of the figures in the R.R. At the same time, however, we have to be careful not to set the figures on the S.B. too far to the left, as there is then a risk of getting a negative number in the R.R. on the first minus turn. The following rule should be applied: If the first of the divisor is lower in value than the first figure of the dividend transferred to the R.R., the divisor should be set up in such a way that the first figure comes directly above that of the first figure of the dividend. On the other hand, if the first figure of the divisor is higher in value than the first figure of the dividend, it should be set directly above the second figure of the dividend.

Again, if the first figures of the divisor and dividend are of equal value, it is advisable to let the second figure of the two numbers decide where the divisor is to be placed.

Additive division

It is not absolutely necessary to adhere to the method described above, using repeated subtraction (subtractive division). Sometimes it is much easier to make use of the diametrically opposing method of additive division. Briefly, this method aims at a search for the given dividend in the R.R. by repeated plus turns, after having set up the divisor on the S.B. As usual, the answer is read off in the P.R.

Example: $\frac{654114}{2345} = 278.94$

First of all clear all registers and set the carriage as far as it will go to the right. Now set up the divisor, 2345, with its first digit immediately above the 13th aperture of the R.R. (6—3). The S.B. then shows 00002345.00 Make two plus turns and afterwards move the carriage one step to the left. Here you use 7 plus turns, after which you move the carriage yet another step to the left. Make 8 plus turns and once more move the carriage a step to the left where 9 plus turns are taken. After one more movement of the carriage you make 4 plus turns.

After setting off the decimal the R.R. now shows 654114.3000000 and there is very little hope of getting any closer to the given dividend. The number of decimals in the R.R. is 7, with 2 on the S.B. The difference, 7—2=5, This, therefore, is the correct number of decimals of the P.R. The required quotient will therefore be 278.94, and you would have achieved the same result by subtractive division.

We will now give you a few practical examples in which you will have an opportunity of testing your skill.

In all parts of the world and in the most diverse fields of activity: commerce, industry, agriculture, hospitals and scientific institutions Original-Odhner calculating machines are used.

CALCULATIONS OF PROPORTION

1. Five gardeners together agree to carry out special gardening work for a lump sum of Kr. 1,240:—. According to the agreement reached, the amount is to be apportioned between them in relation to the total working hours of each one.

A	worked	42	hours
B	,,	44	,,
C	,,	47	,,
D	,,	58	,,
E	,,	59	,,
	Total	250	hours

How much should each one of the five gardeners receive?

Solution:

First of all you calculate the co-efficient of average which equals $\frac{1240}{250} = 4.96$. Set up this figure at extreme right on the S.B. and then multiply first by 42, then in succession by 44, 47, 58 and 59 without clearing the registers at any time during the operation.

Answer: A. gets 208: 32, B. 218: 24, C. 233: 12, D. 287: 68 and E. 292: 64 Krs.

2. Calculate the relative percentages of the following amounts to a turnover of Kr. 93,638:—.

Wages	Kr.	2428:32	Result	2.59 %
Rent	,,	936:—		1.00 ,,
Travelling expenses	,,	4122:—		4.40 ,,
Publicity	,,	538:50		0.58 ,,
Office expenses	,,	2346:50		2.51 ,,
Sundry expenses	,,	2738:—		2.92 ,,
Total	Kr.	13109:32		14.00 %

Solution:

Set up 93638 (5—1), move carriage to extreme right hand postition and, by positive turns, crank up the expense amounts in R.R. (additive division). The R.R. and P.R. must be cleared after each multiplication.

CALCULATIONS OF CURRENCY

3. How many dollars will you get for 22,500 Fr. francs if the rate of exchange is Frs. 100 = Kr. 1:47 and 1 Dollar = Kr. 5:18?

$$\text{Formula: } \frac{22500 \times 0.0147}{5.18} = ?$$

Solution:

Set up 22500 on S.B. (10—6). Multiply by 147. Do not overlook the correct placing of the decimal pointer. Clear P.R. Set up 518 on S.B. Divide subtractively.

Answer: 63.85 dollars.

CALCULATIONS OF MERCHANDISE

4. In a business, 23491 kg. merchandise has been purchased at a rate of 18/6d. per ton. What is the cost of the entire quantity? (1 ton=1016 kg. — according to the table, 18/6d equals 0.92500.

$$\text{Formula: } \frac{23491 \times 0.925}{1016} = ?$$

Solution:

Put the carriage into postion 5 and, by positive turns, multiply $23491 \times 0.925 = 21729.175$ which is then subtractively divided by 1016. Result (in P.R.): 21.38698 which, as per table, equals £ 21.7.9.

CALCULATIONS OF DISCOUNT AND PERCENTAGES

5. An item of merchandise has been purchased at a cost of Kr. 214: 18. The goods are to be sold with a gross advance of 35 %. What will be the retail price?

Formula: $\frac{214.18}{(100—35)} \times 100 = \frac{21418}{65} = ?$

Solution:

After you have simplified the problem in the manner indicated by the formula, divide subtractively 21418 by 65, and read off the result in P.R.

Answer: 329:51

6. A discount of 15 % is allowed off a number of various amounts. Calculate the discount to be deducted, as well as the net amount.

				Discount	Net amount
Kr.	329:50	less	15 %	49:43	280:07
,,	449:80	,,	,,	67:47	382:33
,,	518:30	,,	,,	77:75	440:55
,,	631:58	,,	,,	94:74	536:84

Solution:

To the left on S.B. set up 15 (9—8) and to the right 85=100—15 (2—1). Crank up the gross amount on P.R. by positive turns. The discounts can then be read off to the left on R.R. while the net amounts are shown to the right. The set-up figures do not change between each calculation. No zero setting of R.R. and P.R. is necessary.

7. When calculating consecutive sets of discounts, good use can be made of the back transfer device as shown in the following example:

353 @ 1:75	Kr.	617:75
less 15 % discount	,,	92:66
	Kr.	525:09
less $2^1/_2$ % cash discount	,,	13:13
Net	Kr.	511:96

Solution:

Set up figures 353 (3—1). Multiply by 1.75 (3—1) =617:75.

Place the carriage in position 1 and clear S.B. and P.R. Depress the back transfer button and set R.R. to zero. Multiply by 15 (2—1)=92.6625 and clear R.R. once more. By a plus turn in position 3 you then multiply by 100. The P.R. still retains the figure 15 which you may now remove by minus turns with the crank. The figure 525,0875 can now be read off in the R.R. Now clear S.B. and P.R. once more, depress the back transfer button and zero set R.R. Then multiply by 2.5 (2—1) and read off the cash discount: 13,1271875. Clear R.R., multiply by 100 (1 plus turn in position 4), crank off figure 2.5 from P.R. and the final result, 511,9603125 is obtained.

CALCULATIONS OF WAGES

8. An operator has worked a 48 hour week plus 4 hours overtime. His wages are Kr. 2.89 per hour, and he gets 50 % higher rate for overtime. At the time of payment a deduction of Kr. 5:— is made for tax, Kr. 12:— for an advance and Kr. 14:— for rent. What will his net wages amount to?

Solution:

Set up 2.89 to the extreme right on the S.B. (3—1) and multiply by 4 plus 50 %, i.e. by 6. Note down the result, 17,34 and continue to turn the handle until you get 48 in the P.R. Again note the result, 138.72, and then add 17.34 by turning the handle

in 6 plus turns with the carriage in normal position. The result will be 156.06. Clear the P.R. and alter the setting on the S.B. to 0999999999, but do not disturb the R.R. Crank up 12.00 on the P.R. The R.R. will then, at its right hand side, show the total . . . 00144.06, i.e. 156.06—12.00. Clear the P.R. and crank up the next deduction, 5.00. In the right hand portion of the R.R. you will then get 00139.06

Clear the P.R. and crank up 14.00, when the right hand portion of the R.R. will show . . . 00125.06, which will be the net amount required. In the left hand portion of the R.R. you will then find the total deduction, 31.00.

CALCULATIONS OF AREAS

9. The 4 walls of a room of the size $5.23 \times 4.19 \times 3.15$ m. are to be painted. There are two areas to be deducted, comprising 2 windows 1.12×1.85 m. each, and two doors of which one is $1,20 \times 2.12$ m. and the other 2.05×0.90 vm. The cost quoted is Kr. 3:65 per square meter. How large is the total area to be painted and what will be the total cost?

Formula: $[2 \times (5.23 + 4.19) \times 3.15 - 2 \times 1.12 \times 1.85 - 1.20 \times 2.12 - 0.90 \times 2.05] \times 3.65$

Solution:

Set up 5.23 and multiply by 2, change the figures on S.B. to 4.19 and again multiply by 2. The product, 18.84, is transferred to S.B. and multiplied by 3.15. Now clear S.B. and P.R., leaving the result, 59.3460 on R.R. Set up consecutively on S.B. 2.24, 2.12 and 2.05 and multiply *negatively*, first by 1.85, then 1.20 and, finally, by 0.90. The result, 50.813 is then multiplied by 3.65.

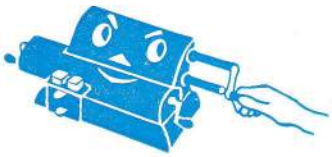
Result: 50.813 square meters @ Kr. 3.65 = Kr. 185:47.

SQUARE ROOT EXTRACTIONS

10. What is the square root of 966289?

Solution:

a. The figures 966289 are set up to the extreme left on R.R. Once this has been done, clear S.B. and P.R.
b. Split up the figures into groups with the aid of the decimal buttons from right to left and include two figures in each group, thus: 96/62/89. Put the carriage to the right so that the largest number of digits possible may be obtained in P.R.
c. Put figure 1 into the track above the 6 in the left hand group. Subtract once. Change the 1 into a 3 and subtract once more. Continue in this manner with odd numbers up to and including 19, when you will hear the bell.
d. Complete a plus turn. Now change the odd number on S.B. to the nearest even number below = 18.
e. Move the carriage one step to the left and put up figure 1 on S.B. This will cause the number 18 to become 181. Now subtract by 181, 183, 185 and so on. When you come to 197 you will hear the bell, and you will then make a plus turn and exchange the old number of 197 for the even number 196.
f. The carriage will now have to be moved one more step to the left. Proceeding in the same manner as before, you add digit 1 to 196, making this 1961, and subtract again, first by 1961, then 1963 and finally 1965. The remainder of the figures in R.R. will disappear on the last subtraction, and this concludes the operation. It is only for you to read off the result in P.R. where you will find the number 983. This is the square root of the given set of figures. You can check this by carrying out the multiplication 983×983, which equals 966289.



Remember that your new Odhner is an instrument of precision, built to function satisfactorily for many years. As the oil is used up, however, the mechanism will be exposed to wear and tear. We, therefore, advice you to let an Odhner mechanic look after the machine for you. This service is well worth the slight cost. The design of the machine is such that it automatically refuses to operate if it is handled in such a way that there is risk of damage to the mechanism due to faulty manipulation. *Never apply force to overcome any resistance that the machine may offer, as this happens only when one of the operating features has been set in the wrong position and has to be corrected before further calculations can be carried out.*

Clearing the registers or bringing the main crank back to its original position generally releases any possible locking of the operating parts. *If the trouble is not cured by this expedient, call in an approved Odhner mechanic.*


ORIGINAL-ODHNER
This map shows where general agents of Original-Odhner can be found.

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A consignment of Odhner machines being put on board a vessel in the harbour of Gothenburg.

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ORIGINAL-ODHNER

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