How to become an expert calculator on the

FACIT

NTK

1
÷
= 9
2×3
7÷
8·4
+

0000581601216

000047.1

123456
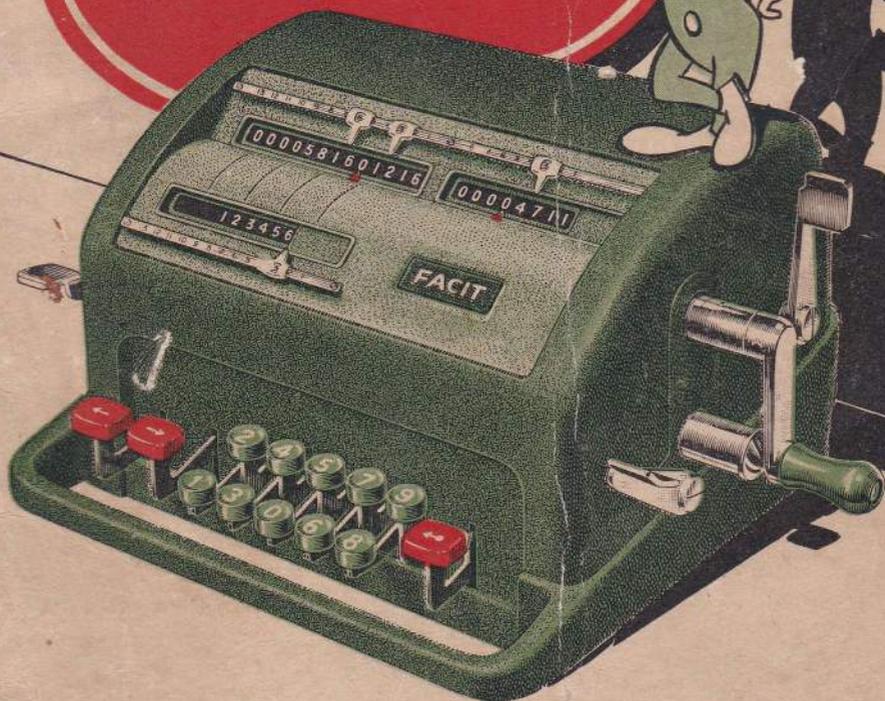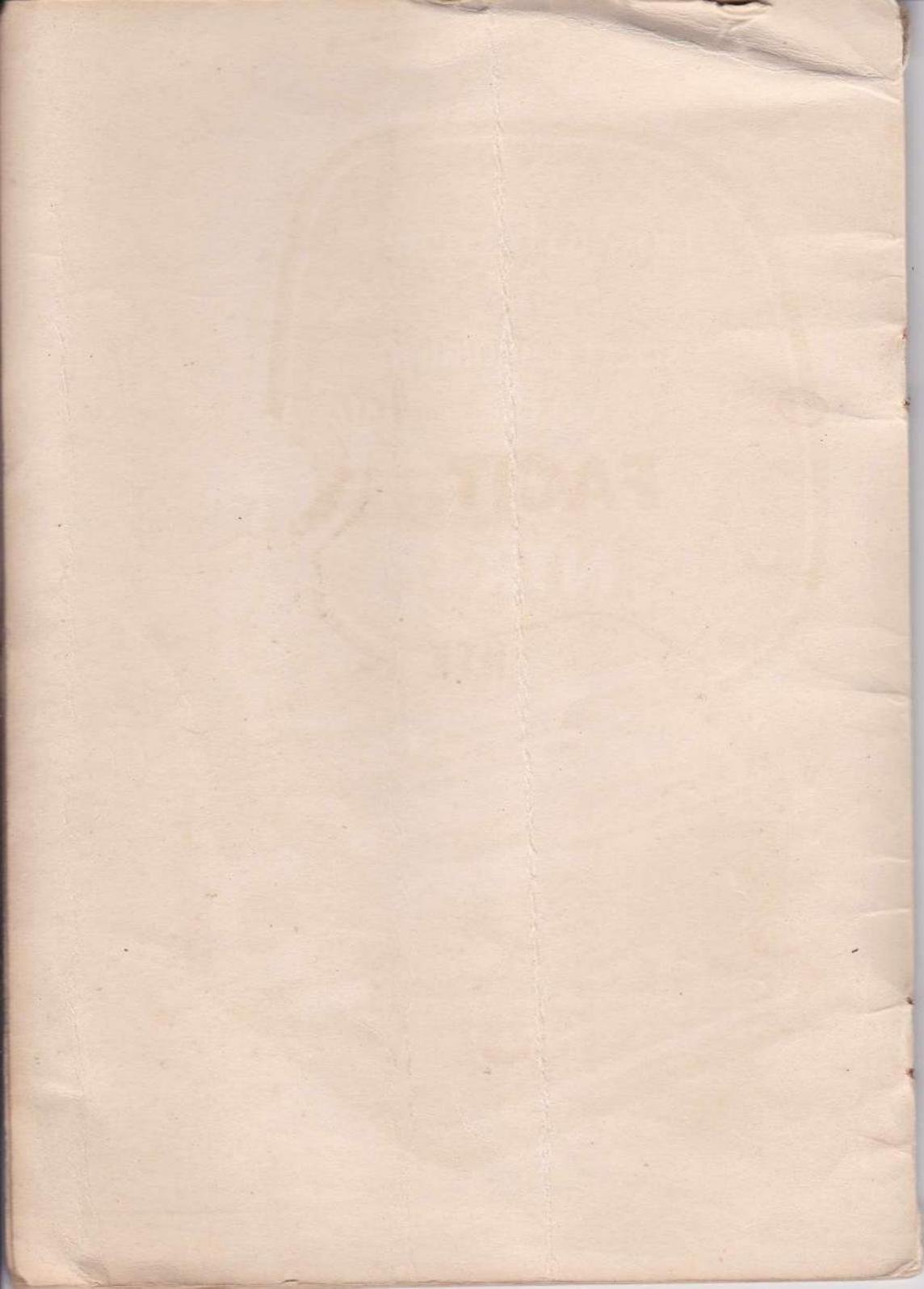
FACIT

Manual

for the

calculating machine

FACIT

model

NTK

Contents

The

FACIT NTK

masters

all the 4 rules

of arithmetic

by means of

10 setting keys only

The Facit 10-keyed calculating machines have in a few short years gained a very strong position on all the markets of the world by reason of their first class quality and reliability, in addition to the useful calculations which they are capable of handling.

As will be shown in this manual the Facit NTK is extremely easy to operate once you have gained knowledge of the correct way to go about it. For this reason it is really worth while to study this little book thoroughly before commencing any work on the machine.

FACIT NTK

at your service ...

Anyone with a previous knowledge of calculating machines will be interested to note that the Facit NTK, in addition to the 10-key system, also shows the following features:

1) overall tens transmission in the product and multiplier registers, which facilitates short-cuts, gives immediate readings and ensures complete reliability;

2) direct division setting which saves brain work and increases speed;

3) rapid zero clearing which greatly speeds up operation.
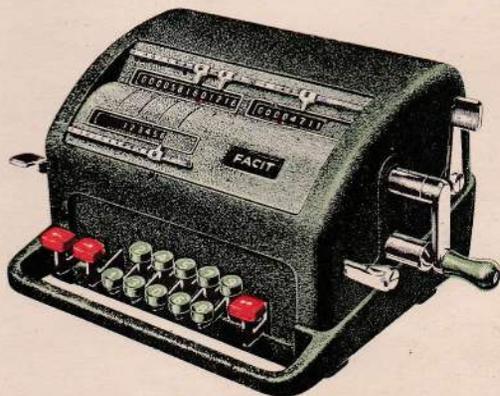
Learn to know the working parts
of the machine

Clearing lever
for
multiplier register

Handle

Clearing lever
for
product register

FACIT

Clearing lever
for
setting register

Carriage shift keys
for step movements

Setting keys

Tabulator
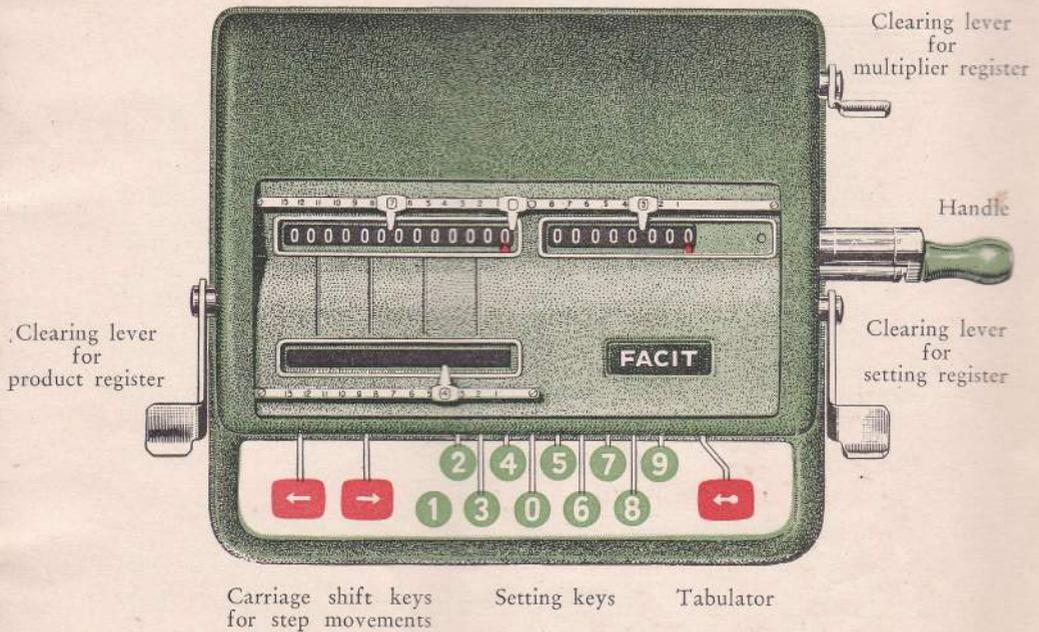
In the above illustration, which shows the machine as seen from above, the various operating levers and keys are easily recognizable. Try to memorize their names—that will help you to get acquainted with the machine and its operation in a short time.

The 3 registers

Product register

Multiplier register

Setting register

The Product register

In addition, subtraction and multiplication the answer will be shown in the product register. This register also shows the remainder left after a division.

The Setting register

Every numeral depressed by the setting keys is immediately shown in the setting register.

The Multiplier register

In addition the multiplier register shows the number of items added together. In multiplication the multiplier appears in this register.

In division the answer (the quotient) is shown here.

The terms employed for the four rules of artithmetic are to be found on the inside rear cover.

Clearing the registers

Each of the three registers has its own clearing lever. Remember to clear all the registers after each completed computation. This is done in the following manner:

With your left hand press down the left hand clearing lever, and with your right press the two clearing levers together against each other.
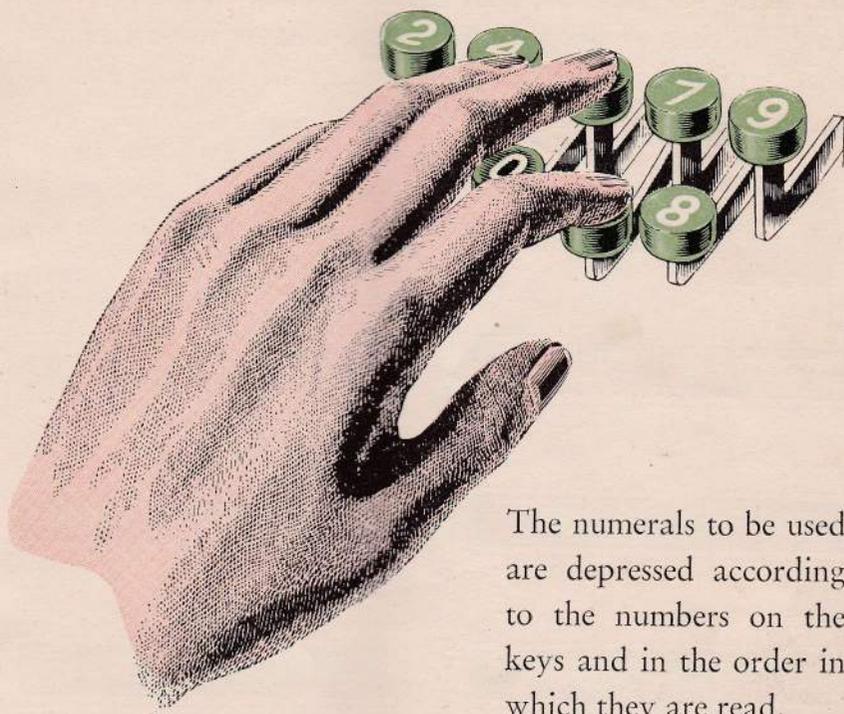
The numerals to be used are depressed according to the numbers on the keys and in the order in which they are read.

Example: The number 1365 is to be set up. First press down the figure 1, then the 3, the 6, and the 5. For each key depressed, the corresponding figure will appear in the setting register.

Setting register

The carriage shift keys

The setting mechanism, and with it the set-up numerals in the setting register, are moved step by step to the right or left by means of the red carriage shift keys. The arrow on the keys indicates the direction in which the movement takes place.

The left hand shift key moves the set-up numerals towards the left.

The right hand shift key moves the numerals to the right.
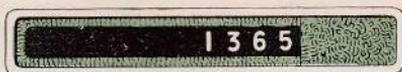
The tabulator

By a single depression of the red tabulator key (to the right on the keyboard) the setting carrier is brought to the left as far as it will travel, and this is the usual procedure for division.

At the same time the set-up number is completed with noughts if it contains less than 6 digits. See illustration.

Calculations are made
by turning the handle

When the required numerals have been set up in the machine, you can add, subtract, multiply or divide by a few turns of the handle.

The crank is locked in normal position.

While the crank is being turned it is necessary to pull out the handle (as shown by the arrow) and keep it pulled out until the required number of turns have been completed. All turning movements should be carried out smoothly and evenly, not by jerks.
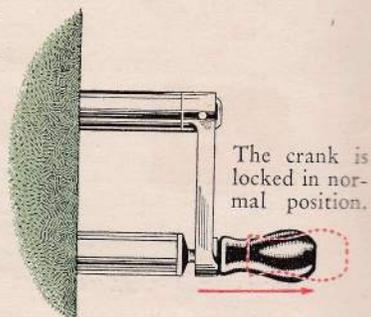
Pulling out the handle in the direction shown by the arrow unlocks the crank.
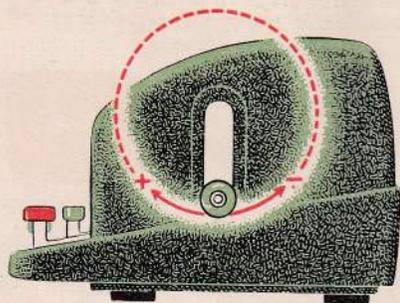
Crank forwards (positive turn) to add, and backwards (negative turn) to subtract a number, whichever the calculation requires

A negative turn cancels a positive turn and vice versa—permitting instantaneous correction of cranking mistakes.

After cranking the necessary number of turns the crank must be set in its normal resting position before the mechanism can be cleared and a new calculating operation begun.

9

Positive and negative turns

The number of turns made is shown in the *multiplier register*. This has a turn direction indicator which shows red for negative coupling. Positive or negative coupling is determined as soon as the crank has been turned about half an inch in the positive or negative direction, irrespective of whether the turn is completed in this initial direction or reversed and completed in the opposite direction. A turn that has been initiated more than an inch must be completed. Negative coupling is discontinued when the register is cleared with the clearing lever.

The multiplier mechanism counts the number of *positive turns* when the first and following turns are positive. It counts the number of *negative turns* when the first and following turns are negative.

If positive turns are made with a negative coupled register, it counts backwards, that is to say, it takes off one for each turn. If a start is made with noughts alone, or the zero line is passed during calculation, the complement of the last number registered in the multiplier register is obtained automatically. (Complement of $1 = 999999999$.)

The turn direction indicator on the multiplier register showing that the machine is ready for negative operation.

The position indicator

The red position indicators in the multiplier and product registers are controlled by the red shift and tabulator keys and thus indicate in which column position the machine operates at the moment.


Product register

Multiplier register

10

**Set up the figures
with your left hand
— turn the handle
with the right**
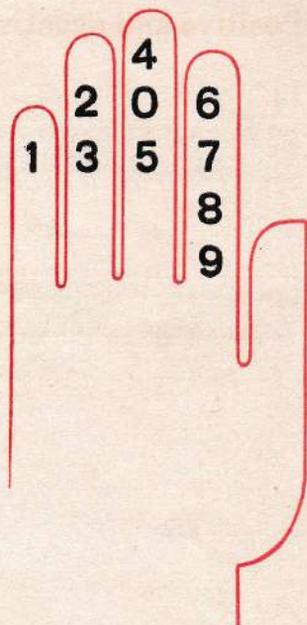
The illustration shows
which fingers are used to
press down the various set-
ting keys according to the
touch system for which the
machine has been designed.

By practising this system right from the start you will very soon
learn how to calculate speedily and correctly. You will find that after
a short period there is no need for you even to look at the keyboard,
just like a trained typist who has no need to watch the keys.

By this left hand system the right hand is always free for the recurring
turning movements and clearing operations as well as for making
notes.

11

Decimal point placement
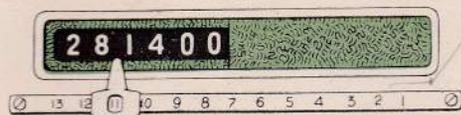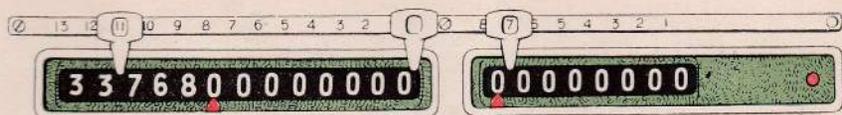
The decimal pointers are position-ed at the register windows. They are displaceable and provided with an "eye". Position the decimal pointer so that the figure in the "eye" marks the number of de-cimals.

Rules for decimal point

Addition and subtraction. Position the decimal point identically in the setting and in the product register. Set up all numbers with the same number of decimals so that they come right relative to the decimal point in the setting register.

Multiplication. The number of decimals in the product register is to be the same as the sum of the decimals in the setting up and multiplier registers. Mark the position of the decimal point in the product register according to rule before starting calculation.

Division. The number of decimals in the multiplier register is to be the same as the difference between the number of decimals in the product and setting up registers. You can avoid unnecessary calculating work if you determine the position of the decimal point and how many decimals are needed in the answer (quotient) before you start to divide. See also the example at the top of the page.

Look upon your new Facit NTK as a carefully manufactured instrument ... and treat it accordingly

The FACIT NTK is a precision machine throughout. It is designed and built to give perfect service for many years. Regular attention will guarantee good and reliable service.

Unlike the majority of calculating machines the FACIT NTK is entirely enclosed and thus protected against dust.

Naturally the mechanism will be subject to a certain amount of wear as the oil is gradually consumed. Like all other machines it needs cleaning, oiling and adjusting now and then. This should be done once a year, preferably by a serviceman approved by the makers.

Obviously the maker's guarantee will be rendered inoperative if the machine has been oiled or repaired by unskilled labour.
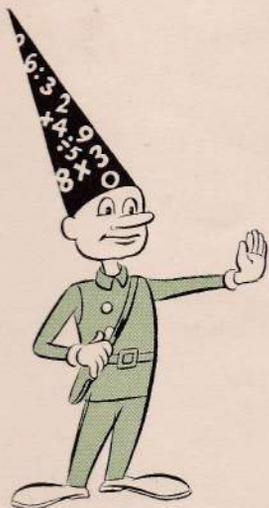
The machine is foolproof

This means that you can never carry out two simultaneous operations by mistake.

The machine is so designed that it automatically opposes every manipulation which might jeopardize the reliability of the calculation or possibly damage the mechanism.

Never try to force the machine if it jams. Jamming indicates that some of the operating parts have locked—these must be restored to normal position before you can resume calculating. Most of the time you can unlock the parts by clearing all registers or setting the handle in its original position. If these measures fail, you should get in touch with an authorized FACIT mechanic.

Addition +

Example: $3478 + 394 + 85 + 8962 = ?$

Set up the first four numerals by depressing the appropriate keys. Make one forward turn. From the setting register the numerals will then be transferred to the product register, which will show `0000000003478` Clear the setting register. Set up the next numerals, 394, and make a forward turn. The total of the two sets of numerals will then appear in the product register `0000000003872` Clear the setting register once more and continue to add the remaining items. If you have set up the figures correctly, the product register will show the total sum to be `0000000012919` The multiplier register, at the same time, records that you have added 4 items in all `0000000 4      •`

Clear all the registers when you have completed the calculation.

Subtraction —
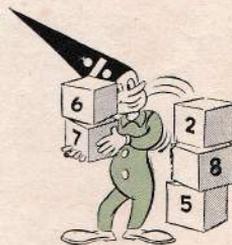
Example: $276543 - 80927 = ?$

Set up the numerals 276543. Make a forward turn so as to transfer the figures from the setting register to the product register.

Clear the setting register. Set up the lesser number, 80927. Make a backward turn and read off the result `0000000195616` in the product register. This number is the difference between 276543 and 80927.

Clear all the registers when you have completed the calculation.
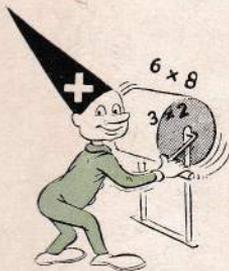
X Multiplication

Example: $6943259 \times 2043 = ?$

Set up the greater factor 6943259. Make 3 forward turns.

The multiplier register now shows `00000003` •

The product register shows (6943259×3) `0000020829777`

Press down, once only, the left hand carriage shift key ← . This will cause the carriage to move one step to the left, which is also recorded by the position indicator. Now make 4 forward turns. You have now multiplied by 43. Look at the multiplier register; it shows `00000043` •

The product register shows `0000298560137`

Press the left hand shift key twice ← (passing the figure 0 in the multiplier) and make 2 forward turns. You have now completed the multiplication and can read the answer (the product) in the product register `0014185078137`

The setting register shows the multiplicand `6943259`

The multiplier register records the multiplier `00002043` •

In this way you are able to check that the correct manipulations have been carried out.

Clear all the registers when you have completed the calculation.

Division   ÷

Example: 9955128 : 302 = ?

Set up the dividend 9955128 by the setting keys. Press the tabulator [←]. Transfer the setting to the product register by a forward turn, then clear the setting and multiplier registers.

Set up the divisor 302 by the appropriate keys. Press the tabulator [→]. Make backward turns until you hear a bell ring and then one forward turn. The product register will now show
`08951 28000000` and the multiplier register `30000000`
Press the right hand shift key [→] once and continue with backward turns until the bell rings, then one forward turn. The product register now shows `0291128000000` and the multiplier register `32000000`
Depress the right hand shift key [→] once more and turn the handle backwards until the bell rings, then one turn forward. Now the product register shows `0019328000000` and the multiplier register `32900000`
Once again depress the right hand shift key [→], crank backwards until the bell rings, then one forward turn. The product register shows `0001208000000` and the multiplier register `32960000`
Again press down the right hand shift key [→] and continue backward turns until the bell rings, then a forward turn. The product register now shows nothing but noughts. The division could be completed without leaving a remainder. The answer (quotient) is recorded in the multiplier register `32964000`

Clear all the registers when you have completed the calculation.

**Addition and subtraction
of numbers consisting
of more than 9, but less
than 13 digits**

Example: 57 832 965 782 + 156 879 623 163 — 5 289 433 223   =   ?

Set up as many of the first figures of the number as the setting register can hold (9 figures). The two last figures, therefore, have to be left out. Depress the left hand shift key 🔙 twice (or as many times as there are remaining figures in the number).

Make a forward turn.

The product register shows   `0057832965700`

Clear the setting register. Now set up the two remaining figures, 82, and make a forward turn. The product register now shows the complete number   `0057832965782`

Clear the setting register. Set up the first 9 figures in the next number. Press the left hand shift key 🔙 three times and make a forward turn. The product register now shows   `0214712588782`
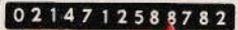
Clear the setting register. Set up the three remaining figures, 163, and make a forward turn.

The product register now shows the total sum of the two added numbers   `0214712588945`

Clear the setting register again. Set up the first 9 figures of the

next number. Press left hand shift key ⬅ once and make a back-
ward turn (subtraction).

Clear the setting register, set up the remaining figure 3, and make
one more backward turn.

The answer to the entire calculation is now ready and appears in the
product register 0 2 0 9 4 2 3 1 5 5 7 2 2
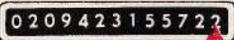
Subtraction below zero
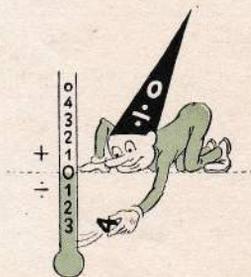
Example: $57-68+34-136 = ?$

Set up the number 57. Give one forward turn. Clear the setting
register. Set up 68. Make one backward turn. The product register
now shows 9 9 9 9 9 9 9 9 9 9 9 8 9
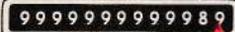
Clear setting register and set up the next number, 34. Make a
forward turn. Product register shows 0 0 0 0 0 0 0 0 0 0 2 3

Clear setting register and set up 136. Give one negative turn.
Product register shows 9 9 9 9 9 9 9 9 9 8 8 7 which is a complement-
ary number indicating that the result is a negative number. To read
off the answer, clear the setting register and set up three nines
immediately followed by 887 (the number found behind the nines
in the product register). Turn the handle twice backward. The prod-
uct register now shows 9 9 9 9 9 8 0 0 0 1 1 3 The answer is —113.
The digits to the left of the noughts are of no importance.
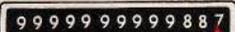
Short-cut multiplication

If the multiplier contains figures of a higher value than 5, for example 8, it saves time to use the so-called short-cut multiplication method. This is performed by first moving the handle *from its original position* about an inch in the forward direction. You then bring forth the 8 by making two backward turns. The multiplier register to the left of the position indicator will then be filled by nines. In order to remove these nines you press the left hand shift key ⬅ once and make a forward turn (8 being the same as $-2+10$). By saving all the turns required for the operation in the normal way of multiplication you will effect a time-saving of up to 40 % by using short-cuts.

If, instead, you move the handle at once in the negative direction, there will appear to the right in the multiplier register a red dot which indicates that the register is set for minus or negative operation. If this is the case you will have to clear the multiplier register and the product register and repeat the operation.

Example: $758 \times 819 = ?$

Set up 758 by pressing the setting keys. Move the handle about an inch in the forward direction and then make a negative turn. The multiplier register will show a row of nines.

Press the left hand shift key ⬅ and make two forward turns so that a figure 1 appears in the multiplier register.

Press the left hand shift key ⬅ and make two backward (negative) turns.

20

Depress the left hand shift key once more and make one positive turn. The product register now gives the answer, which is

`0000000620802`

You have completed the operation by 6 turns of the handle. Had you multiplied in the ordinary manner it would have taken 18 turns to get the same result.

Multiplication involving addition of products

Example: 2495 × 374 + 4694 × 38 = ?

The multiplication 2495 × 374 is performed in the ordinary manner.
The product register now shows `0000000933130`
Clear the setting and multiplier registers.
Multiply 4694 by 38.
The product register shows the total amount of the two multiplications `0000001111502`

Continuous multiplication

Example: 127 × 12 × 311 = ?
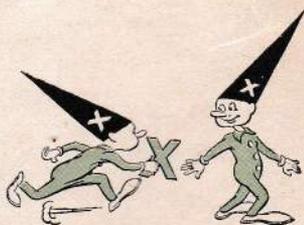
The multiplication 127 × 12 is performed in the normal way.
The product register shows `0000000001524`
Clear the setting register. Set up the obtained product, 1524, and make a backward turn, causing the product register to show nothing but noughts.
Clear the multiplier register. Multiply 1524 by 311. The product register shows the answer `0000000473964`

Division by
multiplication

Example: 672:28 = ?
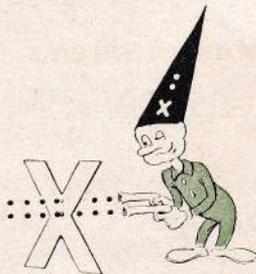
Division can be done in two ways. The most common method has been described previously.

You can also divide by multiplying the divisor (28) as many times as required to reach the value of the dividend (672). By this method you gain the advantage of being able to read off the answer as well as dividend and divisor, each in its appropriate register.

Set up 28. Press tabulator ← and continue with positive turns until the number in the product register as near as possible approaches the first two figures of the dividend (67)*. After two forward turns the figures 56 will appear in the product register; after three, the figures 84. You therefore stop after two turns.

Press the right hand shift key → and keep turning the handle forward until the factor in the product register comes as close as possible to, or equals, the dividend (672).

After 4 turns the product register shows the dividend

`672000000000`

The setting register shows the divisor `280000`

The multiplier register shows the answer `24000000` `•`

---

* The corresponding number of figures of the divisor, in this case two.

Rule of three

The rule of three is the name of a calculating operation, which may look as follows:

$$Example: \quad \frac{35875 \times 435}{725} = ?$$

First you set up the largest factor of the dividend (above the line) preceded by a 0, thus 035875. The nought is introduced to keep you from exceeding the capacity of the machine. Press the tabulator 　.

It will be seen that the position indicator is now set to the extreme left in the multiplier register, and consequently you carry out the multiplication by the figures 435 in the order they appear, *from left to right in the multiplier.*

You therefore multiply first by 4. Then press the right hand shift key 　 and multiply by 3. Press right hand shift key 　 once more and multiply by 5.

The multiplier register shows 　4 3 5 0 0 0 0 0 　 •

To the left in the product register, you now get 　1 5 6 0 5 6 2 5 0 0 0 0 0 　 which is your product.

Clear setting and multiplier registers. Set up 725. As the first figure of the divisor is greater than the first figure of the dividend one nought is set up in front of the divisor. This will give one more decimal in the answer.

The nought in front of the number is not necessary.

Press the tabulator 　 and carry out the division in the usual way.

The multiplier register records the answer 　2 1 5 2 5 0 0 0

If the division is uneven, there will be a remainder which is less than the divisor and it will be shown in the product register.

Reciprocal values

By the expression reciprocal values is meant: 1 divided by a number or, expressed in fractions: $\dfrac{1}{\text{number}}$

$$Example: \quad \frac{1}{98} = ?$$

This operation can be carried out as an ordinary division, but the simplest method is the following:

Set up 98. Press tabulator ▭ and turn handle forward until bell rings, in this particular case, two turns. You will hear the bell at the second turn. This indicates that you have gone a turn too many and, therefore, you have to make a negative turn. Press the right hand shift key ▭ once and make a forward turn. The bell rings and you therefore give the handle a backward turn. Press the right hand shift key ▭ again and continue in this manner until the multiplier register has been completely filled with figures. The answer will appear in the multiplier register and is ▭ 10 2 04 08 1 •

The decimal point is positioned according to the following rule: Put in front of the answer you received in the multiplier register as many noughts as there are units in the original number, in this case two noughts. The first of these is the unit nought. The answer is therefore 0.010204081.

Remember these arithmetical terms

The four rules of arithmetic

+ Addition

addendum + addendum = total

— Subtraction

minuendum — subtrahend = remainder

× Multiplication

multiplicand × multiplier = product

The multiplicand and multiplier are also called factors

÷ Division

dividend ÷ divisor = quotient

Dividend and divisor can also be expressed thus:

$$\frac{dividend}{divisor} \quad \text{and are then called} \quad \frac{numerator}{denominator}$$

If the numerator consists of 2 factors, the term is *rule of three:*

$$\frac{\text{factor} \times \text{factor}}{\text{divisor}} \quad \frac{(numerator)}{(denominator)} = quotient$$

Thanks for your interest!

In more ways than one the Facit calculating

machine will save you the time you have

spent reading this little book.