

Directions for the Proper Use
of the

MADAS

TRIPLEX 20ATG AND 20ATZG

**Full-automatic
Calculating Machine**



Manufacturers:

H. W. EGLI LTD., ZURICH 2

Seestrasse 356 / Switzerland

Agencies all over the world

Description

- a : Windows of the multiplier setting register.
- b : Buttons for setting figures directly in the multiplier setting register.
- d : Decimal pointer rails with movable decimal pointers.
- e : 10-column self-correcting flexible keyboard.
- é : Check register III of the figures set on the keyboard.
- f : Windows of the revolution register II; divided in two equal halves; the one on the right-hand side possessing complete capacity carry-over, the left one not having it. The model 20ATZG possesses only the one revolution register lying in the right-hand half of the carriage.
- g : Windows of the product register I. In this register the carry-over capacity does not go as far as the extreme left, but only two windows beyond the one opposite the extreme left-hand key-column of the keyboard. In 20ATZG Machines, the tens-transmission goes right through.
- h : Windows of the accumulating (upper) product register IV, this register possesses complete capacity carry-over.
- i : Reversible keyboard decimal markers (bars).
- k : Buttons for setting figures directly in the register IV (h).
- m : Buttons for setting figures directly in the register I (g).
- B : Multiplication-bar with double function:
 1. By depressing this key whilst the multiplier setting register (a) is void, an amount in the keyboard (e) is transferred into the multiplier setting register. The carriage moves, thereby always into its left-hand end-position.
 2. By depressing the multiplication-bar whilst there is a number in the multiplier setting register (a), the amount on the keyboard (multiplicand) is multiplied by the multiplier in the multiplier setting register (a).
- C : Knob for controlling the automatic clearing; C is at the left-hand sidewall of the machine and therefore not visible on the annexed illustration. (To engage the automatic clearing, press C inwards; to disengage it, pull C outwards.) See also «Automatic clearing» page 11.
- D : Transfer-key for transferring figures from the product register I into the multiplier setting register (a) and simultaneously zeroizing I (g). In pursuance thereof, the carriage moves into its left-hand end-position. By operating this key there is also released the eventually engaged Rep.-key.
- DIV : Starting-key for division (see also P on page 2 and «Automatic Division» on page 8).
- E : Reversing-lever for the product registers I (g) and IV (h); only for automatic multiplication (see also Y and U).
 - Position «+» for automatic multiplication with simultaneous addition of the product in the registers I (g) and IV (h).
 - Position «—» for automatic multiplication with simultaneous subtraction of the product from an amount in the registers I (g) and IV (h).
- F : Marks serving as fixed signs to determine the decimals; the second is on the right-hand side of the latch Q.

- G : Key for clearing the multiplier setting register (a), to depress also in case the automatic clearing be disengaged by the position the knob H is occupying.
- H : Knob for constant multiplier (to engage by pressing backwards, to disengage by pressing downwards, or by operating the clearing key G).
- J : Key for carriage-movement to the right.
- K : Knob on the main shaft; can be replaced by the annexed hand crank in case the electric current fails. See also on page 11: «Interruption of the electric current».
- L : Key for carriage-movement to the left.
- N1 : Reversing lever for the revolution register II (f), will only produce the desired effect if the Plus-key or the Minus-key be depressed.
When this lever is on «+», the revolution register works in the additive, whereas,
when it is on «—», the said register works in the subtractive direction, if the Plus-key is depressed, and N2 above.
- N2 : Reversing lever for revolution register II (f); serves — in case it is on «—» — to calculate the complementary value of either the multiplier or the quotient. When N2 is on «—», there is, moreover, eliminated the effect of the lever N1.
- P : Lever for instantly stopping the process of division; serves also to stop the machine when the DIV.-key has been depressed while there is no divisor set on the keyboard (e) (see also «STOP»).
- Q : Latch to hold the carriage down (of no importance to the operator, but important to the mechanic).
- R : Clearing lever for the accumulating (upper) product register IV (h); to clear this, push R to the right.
- Rep.: Repeat-key (to engage by pressing it downwards and, then, backwards; to release by pressing it downwards). By operating the transfer-keys D and Z, the engaged Rep.-key is automatically released.
- Sp : Knob to disengage the clearing in the right-hand half of the revolution register II (f), (split); to disengage the clearing, turn the knob in a way that its marking line be placed vertically. (This knob does not exist on model 20ATZG).
- STOP: Division-stop-key; this being depressed the particular quotient figure then being calculated is completed before the machine stops. (See also «P».)
- T : Carriage-return-lever; its being pushed down disengages the automatic carriage-return in automatic multiplication.
- U : Control lever for the two product registers I (g) and IV (h). When these two registers are engaged (see also Y) and the lever U is in position «=», the two counters work in the same direction, i. e. either both in the additive or both in the subtractive sense; when the lever is, however, on «∞», the said counters work in opposite direction, i. e. the one in additive and the other in subtractive sense.
- Y : Engaging lever for the accumulating (upper) product register IV (h). When this lever is on «I» (down), only the register I (g) is operating, but when it is on «I and IV» (up), both registers I (g) and IV (h) are in gear.

- Z : Dividend-transfer-key (see «Automatic Division» on page 8, figure 4).
+ : Plus-key.
— : Minus-key.
I : Clearing key for product register I (g).
II : Clearing key for revolution register II (f).
III : Clearing key for keyboard (e) and check register (é).
One, two or all three clearing keys can be depressed simultaneously.

Directions for operating the machine

ADDITION

The sum to be read in the product register I (g) only.

1. Turn the knob Sp in a way that its marking line be placed horizontally; clear the registers I (g), II (f) and the keyboard (e) resp. (é) by depressing the clearing keys I, II and III.
2. Place the engaging lever Y on «I», release the Rep.-key and place the lever N1 on «+» and N2 upwards.
3. Set the different items to be added successively on the keyboard (e) and give each time a short pressure to the Plus-key.
4. Read the sum in the register I (g).

The sum to be read in both product registers I (g) and IV (h).

1. Turn the knob Sp in a way that its marking line be placed horizontally; clear the registers IV (h), I (g), II (f) and the keyboard (e) by pushing the clearing lever R to the right, resp. by depressing the clearing keys I, II and III.
 2. Place the engaging lever Y on «I and IV», release the Rep.-key, place the lever N1 on «+», N2 upwards and the control lever U on «=».
 3. Set the different items to be added successively on the keyboard (e) and give each time a short pressure to the Plus-key.
 4. Read the sum in the register I (g) or IV (h).
- NB. If, then, only the register I (g) be cleared and adding continued, the total of this second series of additions would be visible in the register I (g) and the register IV (h) would show the total of all partial sums.

SUBTRACTION

The difference to be read in the product register I (g) only.

1. Turn the knob Sp in a way that its marking line be placed horizontally; clear the registers I (g), II (f) and the keyboard (e) by depressing the clearing keys I, II and III.

2. Place the engaging lever Y on «I», release the Rep.-key and place the lever N1 on «—» and N2 upwards.
3. Set the minuend in the register I (g) by means of the buttons m or by way of addition (if this latter way be chosen, depress the clearing key II once more).
4. Set the subtrahend on the keyboard (e) and give a short pressure to the Minus-key.
5. Read the difference in the register I (g).

The difference to be read in the accumulating register IV (h).

1. Turn the knob Sp in a way that its marking line be placed horizontally; clear the registers IV (h), I (g), II (f) and the keyboard (e) by means of the clearing lever R resp. the clearing keys I, II and III.
2. Place the engaging lever Y on «I and IV», release the Rep.-key, place the lever N1 on position «—», N2 upwards and the control lever U on «=».
3. Set the minuend by means of the buttons k or by way of addition in IV (h) (if this latter way is chosen, depress the keys I and II once more).
4. Set the subtrahend on the keyboard (e) and give a short pressure to the Minus-key.
5. Read the difference in the accumulating register IV (h). In the windows of the product register I (g) there appears at the same time the complementary value of the subtracted amount.

ADDITION / SUBTRACTION

A number shall be added to an amount in the product register I (g) and simultaneously deducted from an amount in the accumulating product register IV (h).

1. Turn the knob Sp in a way that its marking line be placed horizontally; clear the product registers IV (h), I (g) and the keyboard (e) by means of the clearing lever R and the clearing keys I and III.
2. Place the engaging lever Y on «I and IV», release the Rep.-key, place the lever N1 on «+», N2 upwards and the control lever U on «=».
3. Set the amount to be lessened, by means of the buttons k or by way of addition, in IV (h) (if this latter way be chosen, depress the clearing keys I and II once more).
4. Place the engaging lever Y on «I».
5. Set the amount to be increased, by means of the buttons m or by way of addition, in «I» (g).
6. Place the engaging lever Y again on «I and IV» and the control lever U on «∞»; clear the revolution register II (f) by means of the clearing key II.
7. Set the number which is to be both added and subtracted, on the keyboard (e) and give a short pressure to the Plus-key.
8. Read the sum in the product register I (g) and the difference in the accumulating product register IV (h).

SUBTRACTION / ADDITION

A number shall be subtracted from an amount in the product register I (g) and simultaneously added to an amount in the accumulating product register IV (h).

1. Turn the knob Sp in a way that its marking line be placed horizontally; clear the product registers IV (h), I (g) and the keyboard (e) by means of the clearing lever R and the clearing keys I and III.
2. Place the engaging lever Y on «I and IV», release the Rep.-key, place the lever N1 on «—», N2 upwards and the control lever U on «=».
3. Set the amount to be increased, by means of the buttons k or by way of addition, in IV (h) (if the latter way is chosen, depress the clearing keys I and II once more).
4. Place the engaging lever Y on «I».
5. Set the amount to be lessened, by means of the buttons m or by way of addition, in «I» (g).
6. Place the engaging lever Y again on «I and IV» and the control lever U on «∞»; clear the revolution register II (f) by means of the clearing key II.
7. Set the amount which is to be both subtracted and added on the keyboard (e) and give a short pressure to the Minus-key.
8. Read the difference in the product register I (g) and the sum in the accumulating product register IV (h).

AUTOMATIC MULTIPLICATION

A. The product to appear in the product register I (g) only.

1. Place the engaging lever Y on «I»; turn the knob Sp in a way that its marking line be placed horizontally; clear the register IV (h) by means of the clearing lever R; position of C as required (see page 11, «Automatic clearing»).
 2. Depress the clearing keys I, II, III and G; place the lever E on «+», push the levers T and N2 upwards.
 3. Set the multiplier on the keyboard (e).
 4. Depress the multiplication bar (B), whereby the carriage is moved completely to the left, the multiplier transferred to «a» and the keyboard automatically cleared.
 5. Set the multiplicand on the keyboard (e). If, after the multiplication being completed, the multiplicand is to remain on the keyboard, i. e. shall not be cleared automatically, engage the Rep.-key.
 6. Give again a short pressure to the bar B, whereby the automatic multiplication is started and calculated.
 7. Read the product in the product register I (g).
- NB. In multiplication with simultaneous subtraction of the product the operation of the machine is the same, with the exception that the lever E must be placed on «—» and C pulled outwards.

If in the revolution register II (f), instead of the normal multiplier, its complementary value shall appear, place, under point 1., the lever N2 on «—».

B. The product to appear in the product register I (g) as well as in the accumulating product register IV (h).

1. Place the engaging lever Y on «I and IV»; turn the knob Sp in a way that its marking line be in horizontal position; place the control lever U on «=», clear the register IV (h) by means of the clearing lever R; position of the knob C according to requirement (see page 11, «Automatic clearing»).
2. Depress the clearing keys I, II, III and G; place the lever E on «+» and push the levers T and N2 upwards.
3. Set the multiplier on the keyboard (e).
4. Depress the multiplication bar (B), whereby the carriage is moved completely to the left, the multiplier transferred to «a» and the keyboard automatically cleared.
5. Set the multiplicand on the keyboard (e). If, after the multiplication being completed, the multiplicand is to remain on the keyboard, i. e. shall not be cleared automatically, engage the Rep.-key.
6. Give again a short pressure to the bar B, whereby the automatic multiplication is started and calculated.
7. The product can be read in the product register I (g) as well as in the additional product register IV (h).

B. If the reversing lever E is placed on «+», the control lever U on «∞» and C pulled outwards, a product calculated in accordance with above directions is added in the register I (g) and subtracted simultaneously in the accumulating register IV (h).

If the reversing lever E is placed on «—» and the control lever U on «=» and C pulled outwards, a product calculated in accordance with the above directions is simultaneously subtracted in both registers I (g) and IV (h).

If the reversing lever E is placed on «—», the control lever U on «∞» and C pulled outwards, a product calculated in accordance with the above directions is subtracted in the register I (g) and simultaneously added in the accumulating register IV (h).

If in the revolution register II (f), instead of the normal multiplier, its complementary value shall appear, place, under point 1., the lever N2 on «—».

C. Automatic multiplications by a constant multiplier with the individual products as well as their accumulated total being visible:

1. Place the engaging lever Y on «I and IV»; turn the knob Sp in a way that its marking line be in horizontal position; place the control lever U on «=»; clear the register IV (h) by means of the clearing lever R; press C inwards.
2. Depress the clearing keys I, II, III and G; place the levers E on «+»; push the lever T upwards and the knob H backwards.
3. Set the constant multiplier on the keyboard (e).
4. Depress the multiplication bar B, whereby the carriage is moved completely to the left, the multiplier transferred to «a» and the keyboard (e) automatically cleared.

5. Set the first multiplicand on the keyboard (e).
6. Give again a short pressure to the bar B, whereby the automatic multiplication is started and calculated.
7. Read the first product in the product register I (g).
8. Set the second multiplicand on the keyboard (e) in a way that its decimal point be in the same place as that of the first multiplicand, etc. etc.
9. Give again a short pressure to the bar B, whereby the automatic multiplication is started and calculated.
10. Read the second product in the product register I (g) and the total of the two first products in the accumulating product register IV (h).
11. Proceed, with regard to the third product, in the same way as described under ciphers 8 to 10.

AUTOMATIC CUBING ($a \times b \times c$)

with the individual products as well as their accumulated totals being visible.

1. Place the engaging lever Y on «I»; turn the knob Sp in a way that its marking line be in horizontal position; place the control lever U on «=»; clear the accumulating product register IV (h) by means of the clearing lever R, press C inwards.
2. Depress the clearing keys I, II, III and G; place the lever E and N1 on «+» and push the levers T and N2 upwards.
3. Set the factor «a» at the extreme right on the keyboard (e).
4. Depress the multiplication-bar B, transferring thus the multiplier to the multiplier register (a); the keyboard (e) is thereby automatically cleared.
5. Set the factor «b» at the extreme right on the keyboard (e).
6. Give again a short pressure to the bar B, whereby the automatic multiplication is started and calculated.
7. If necessary, read the product « $a \times b$ » in the product register I (g). Depress the clearing key II.
8. Depress the transfer-key D to transfer the product « $a \times b$ » from the product register I (g) into the multiplier mechanism (a), whereby the former and the keyboard (e) are automatically cleared and the carriage returns into its left-hand end-position.
9. Place the engaging lever Y on «I and IV».
10. Set the factor «c» at the extreme right on the keyboard (e).
11. Give a short pressure to the multiplication-bar B.
12. Read the result of the first cubing in the product register I (g).
13. Place the engaging lever Y on «I».
- 14.—22. As described under ciphers 3 to 11.

Attention: when setting the factors, mind that the decimal point of the preceding multiplication be strictly kept on!

23. Read the result of the second cubing in the product register I (g) and the sum of both cubings in the accumulating product register IV (h).
 24. Place the engaging lever Y on «I». Proceed, with regard to the third cubing, in the same way as described under ciphers 3 to 11.
- NB. If only the calculation of the cubings be required and not also their sums, disconnect, from the first, the accumulating product register IV (h) by leaving the engaging lever Y on «I».

AUTOMATIC DIVISION

An amount in the additional register IV (h) cannot be divided in the automatical way, but by way of consecutive subtractions!

1. Place the engaging lever Y on «I»; turn the knob Sp in a way that its marking line be placed horizontally; clear the additional register IV (h) by means of the clearing lever R. Place the lever N1 on «+» and push the lever N2 upwards.
2. If at the beginning of each division the registers I (g) and II (f) shall be automatically cleared, press the control knob C inwards and clear the keyboard (e) by depressing the clearing key III. In case the automatic clearing of the registers I (g) and II (f) is not desired, pull the control knob C outwards and clear the said registers and the keyboard by depressing the clearing keys I, II and III.
3. Set the dividend at the extreme left on the keyboard (e).
4. Apply a strong pressure to the dividend-transfer-key Z; thereby the Rep.-key is released, the registers I (g) and II (f) are cleared, the carriage is moved to its extreme right-hand position and the dividend is transferred to the register I (g); the keyboard (e) is automatically cleared. Move the decimal pointer of the dividend to its right place.
5. Set the divisor on the keyboard (e) in a way that its extreme left figure be underneath the extreme left figure of the dividend. Mark the decimal point of the divisor in its right place.
If, after the division being completed, the divisor is to remain on the keyboard, i. e. shall not be cleared, engage the Rep.-key.
6. Depress the Div.-key. The division is now calculated automatically up to the last figure, whereupon the machine stops. This operation can, however, be interrupted before, for which there are two possibilities at disposal; viz.:
 - a) on pushing the lever P backwards, the machine stops instantly;
 - b) on depressing the STOP-key, the division will only be stopped when the figure of the quotient just being calculated is completed.
7. To determine the two decimal points in the revolution register II (f), move the carriage by means of the carriage-movement key J to the position in which the decimal pointer of the dividend is opposite the one of the divisor. In this position of the carriage the marks F show the positions in the two halves of the revolution register II (f) into which the decimal pointer of the quotients must be moved.
8. Read the quotient in one of the two halves of the revolution register II (f).

NB. If, after the transfer of the dividend into the register I (g), the engaging lever Y is placed on «I and IV» and the control lever U on «∞» and there is no remainder in the register I (g) after the automatic division being finished, the dividend will have successively appeared in the additional register IV (h). If, however, there is a remainder in the register I (g), add it to the amount which appeared in the register IV (h) in order that, at the conclusion, the dividend be there.

If, instead of the quotient, its complementary value is wanted, there must, in addition to what is said under point 1, the reversing lever N2 be placed on «—». As for the rest, everything remains the same as described in points 1—8.

Divisions by a constant divisor after which the individual quotients as well as their totals and the rounded off totals of the dividends can be seen.

1. Place the engaging lever Y on «I» and the control lever U on «∞». Clear the registers IV (h), I (g), II (f) and the keyboard (e) by means of the clearing lever R and the clearing keys I, II and III.
2. Pull the control knob C outwards and turn the knob Sp in a way that its marking line be placed vertically. Place the lever N1 on «+» and push lever N2 upwards.
3. Set the first dividend on the keyboard (e) leaving, if possible, the three key-columns on the extreme left unused.
4. Give a strong pressure to the dividend-transfer-key Z. Move the decimal pointer of the dividend to its right place.
5. Place the engaging lever Y on «I and IV» and engage the Rep.-key.
6. Set the constant divisor on the keyboard (e) in a way that its extreme left figure be underneath the extreme left figure of the dividend. Mark the decimal point of the divisor in its right place.
7. Depress the Div.-key. The division is now calculated automatically up to the last figure, whereupon the machine stops. This operation can, however, be interrupted before, for which there are two possibilities at disposal; viz.:
 - a) on pushing the lever P backwards, the machine stops instantly;
 - b) on depressing the STOP-key, the division will only be stopped when the figure of the quotient just being calculated is completed.
8. To determine the two decimal points in the revolution register II (f), move the carriage by means of the carriage-movement key J to the position in which the decimal pointer of the dividend is opposite the one of the divisor. In this position of the carriage the marks F show the positions in the two halves of the revolution register II (f) into which the decimal pointers of the quotient must be moved.
9. Read the quotient in one of the two halves of the revolution register II (f) and the dividend (rounded off) in the accumulating register IV (h).
10. Clear the register I (g) and the left-hand half of the revolution register II (f) by depressing the clearing keys I and II.
11. Set the second dividend by means of the setting buttons m in the register I (g), strictly keeping to the decimal point of the preceding dividend.

12. Move the carriage by means of the carriage-movement key J to the position in which the extreme left figure of the dividend is above the extreme left figure of the divisor.
13. Depress the Div.-key.
14. Read the quotient of the second division in the left-hand half of the revolution register II (f), the total of the two first quotients in its right-hand half and the total of the two first dividends (rounded off) in the accumulating product register IV (h).
15. As described under cipher 10.
16. Proceed, with regard to the third quotient, in the same way as described under ciphers 11, 12, 13 and 14 etc.

AMOUNT OF AN INVOICE WITH DEDUCTION OF THE DISCOUNT

Problem: What is the net amount of an invoice for 174,25 metres at Frs. 3,65 after deduction of 2 % discount?

1. Press the control knob C inwards; place the engaging lever Y on «I and IV» and the reversing levers E and N1 on «+»; depress the clearing keys III and G (Registers I (g) and II (f) are cleared automatically); push the carriage-return-lever T and also lever N2 upwards.
2. Push the clearing lever R to the right; turn the knob Sp in a way that its marking line be in horizontal position; place the control lever U on «=»; turn all decimal bars (i) in a way that their green surface be above; move the carriage by means of the key L to its extreme left-hand position.
3. Set the metre price of 3.65 at the extreme right on the keyboard (e); turn the second decimal bar (i) in a way that its yellow surface be above:
 first setting on the keyboard 00000003,65
4. Depress the multiplication-bar B, transferring thus the multiplier 3.65 to the multiplier setting register (a).
5. Set the number of metres 174,25 at the extreme right on the keyboard (e); the decimal point of 174,25 will, thus, forthwith come to lie there where, already from the previous setting on the keyboard, there is a yellow decimal bar (i):
 second setting on the keyboard 00000174,25
6. Depress the multiplication-bar B, whereby the automatic multiplication is started; this being completed, the carriage goes automatically back to its left-hand end position. Mark the decimal point of the price for the metre, 3,65, in the right-hand half of the revolution register II (white ciphers) and move, by depressing the carriage-movement key J, the carriage two places to the right, so that the decimal point in question is opposite the mark F on the right. (After some practice, this movement of the carriage can be avoided by operating in due time the carriage return-lever T so that the carriage be arrested in a way that the decimal point of the factor in the revolution register II (f) be opposite the

respective mark F). In the registers I (g) and IV (h), move a decimal pointer into the elongation of the yellow decimal bar (i):

Accumulating register IV (h) 00000000000000636,0125
 Product register I (g) 00000000000000636,0125
 Revolution register II (f) 000000036500000003,65
 Decimal mark F
 On the keyboard (e) 00000000,00

7. Depress the transfer-key D, transferring thus the gross amount 636.01 to the multiplier setting register (a). The carriage moves into its left-hand end-position.
8. Place the control lever U on «∞»; set the rate of discount 2% = 0.02 on the keyboard (e), observing thereby the yellow decimal bar (i):
 third setting on the keyboard 00000000,02
9. Depress the multiplication-bar B.

10. Read the results:
 Net amount in the register IV (h) 0000000000000623,2923
 Discount in the product register I (g) 0000000000000012,7202
 Gross amount in the revolution register II (f) 000006360100000636,01

AUTOMATIC CLEARING

Besides the possibilities mentioned on page 3 of zeroizing the respective registers by means of the clearing keys I and II, the full-automatic MADAS models 20ATG and 20ATZG have also an automatic clearing, which operates as follows:
 If amounts being, in consequence of a preceding arithmetical operation, in the result register I (g) and in the revolution register II (f) shall be automatically zeroized at the beginning of an automatic multiplication, respectively on the occasion of the dividend-transfer-key Z being operated, press the controlling knob C inwards. To disengage this automatic clearing, pull the controlling knob C outwards.

INTERRUPTION OF THE ELECTRIC CURRENT

Should it happen that the electric current fails and the machine has to be operated by means of the added auxiliary hand crank, take care to turn the crank (which must be mounted with the handle directed downwards) exclusively in clockwise direction. To be able to turn the crank, depress at the same time, the Plus- or the Minus-key, one of the movement-keys J or L, one of the clearing keys I, II or G, the dividend-transfer-key Z, the multiplication bar B, the transfer-key D or the starting-key DIV.

A. TRÜB & CIE. AARAU

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