

**Directions for the Proper Use  
of the**

**MADAS  
TRIPLEX 20 AT**

**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.
- 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.
- 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.
- C : Knob for controlling the automatic clearing; C is at the left-hand side-wall 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).
- 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.
- L : Key for carriage-movement to the left.

- N** : 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 additive sense, whereas, if it is on «—», the said register works in subtractive sense, provided the Plus-key be depressed.
- 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).
- 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.
- STOP** : Division-stop-key; this being depressed the particular quotient figure then being calculated is completed before the machine stops.
- 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 «↓» (down), only the register I (g) is operating, but when it is on «↑ and IV» (up), both registers I (g) and IV (h) are in gear.
- Z** : Dividend-transfer-key (see «Automatic Division» on page 8).
- +** : 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 N 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).

**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 N on «+» 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 N on «-».
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 N on position «—» 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 N on «+» 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 N on «←» 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. Move the carriage by means of the key L to its extreme left-hand position; depress the clearing keys I, II, III and G; place the lever E on «+» and push the lever T upwards.
3. Set the multiplier 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 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.
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.

#### **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

- « $\Rightarrow$ », 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. Move the carriage by means of the key L to its extreme left-hand position; depress the clearing keys I, II, III and G; place the lever E on «+» and push the lever T upwards.
  3. Set the multiplier 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 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.
  7. The product can be read in the product register I (g) as well as in the additional product register IV (h).

NB. If the reversing lever E is placed on «+», the control lever U on « $\infty$ » 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 « $\leftarrow$ » and the control lever U on « $\Leftarrow$ » 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 « $\rightarrow$ », the control lever U on « $\infty$ » 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).

**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 « $\Rightarrow$ »; clear the register IV (h) by means of the clearing R; press C inwards.
2. Move the carriage by means of the key L completely to the left; 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, transferring thus the constant multiplier to the multiplier register (a). The keyboard (e) is thereby 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.
7. Read the first product in the product register I (g).
8. Set the second multiplicand on the keyboard (e).

9. Give again a short pressure to the bar B, whereby the automatic multiplication is started.
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 × b × 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. Move the carriage by means of the key L to its extreme left-hand position; depress the clearing keys I, II, III and G; place the lever E on «+» and push the lever T 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.
7. If necessary, read the product «a × b» in the product register I (g). Depress the clearing key II.
8. Depress the transfer-key D to transfer the product «a × b» from the product register I (g) into the multiplier mechanism (a), whereby the former and the keyboard (e) are automatically cleared.
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.
  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.

**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 register 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.
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 lever E on «+»; depress the clearing keys III and G (Registers I (g) and II (f) are cleared automatically); push the carriage-return-lever T 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 red 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 red decimal bar (i):

second setting on the keyboard . . . . . 00000174,25

6. Depress the multiplication-bar B, whereby the automatic multiplication is started; it 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 read decimal bar (i):  
Accumulating register IV (h) . . . . . 0000000000000636,0125  
Product register I (g) . . . . . 0000000000000636,0125  
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).

8. Place the control lever U on « ∞ »; set the rate of discount  $2\% = 0.02$  on the keyboard (e), observing thereby the red decimal bar (i):  
 third setting on the keyboard . . . . . 00000000,02
9. Move the carriage, by means of the key L, into its extreme left-hand position; depress the multiplication-bar B.
10. Read the results:  
 Net amount in the register IV (h) . . . 00000000000000623,2923  
 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 2 of zeroizing the respective registers by means of the clearing keys I and II, the full-automatic MADAS model 20 AT has 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.

PS. — 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.

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