

Long Divisions with the CURTA

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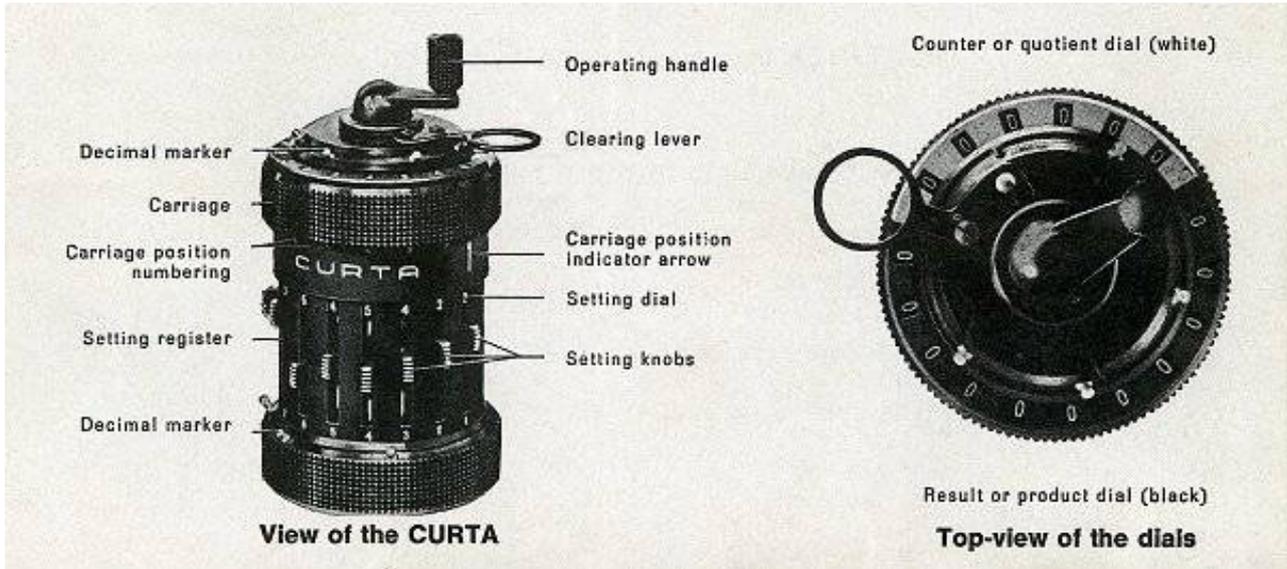


Fig. 1 – Side view

Fig. 2 – Top view

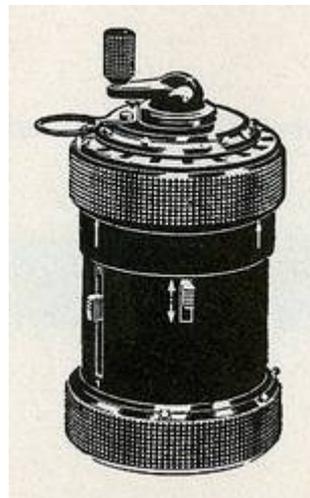


Fig. 3 - Reversing lever

Having just bought a CURTA II, I searched on the web an algorithm for long divisions. Unfortunately I found only procedures suggesting to **add the dividend** how many times as to “*build up in the result dial a number that comes as near as possible to the given dividend*”, thus making no use of the **reversing lever**. I thought this procedure a bit ‘old-fashioned’ and decided to find another way by trials and errors.

I presume the reader is already accustomed with additions and subtractions.

General rule

- 1) Machine Ready (product dial and counter dial to zero)
- 2) Clearing lever as in Fig. 2
- 3) Reversing lever up (Fig. 3)
- 4) Operating handle down (addition)
- 5) Carriage position on **9-n**, where **n** is the number of digit of the dividend (CURTA II). (*)
- 6) Enter **dividend** by the setting knobs. The leftmost digit of the divisor should be in position 8.
- 7) Turn operating handle once, the dividend appears in the result dial and a unit on counter dial.
- 8) Clear counter dial, rotating clearing lever less than half a turn. Be careful not to clear the result dial!
- 9) Set one decimal marker on the counter dial **n** position from left.
- 10) Pull operating handle up (subtraction position)
- 11) Push reversing lever down. (This causes counter dial to increase by 1 for each turn, while product dial decreases)
- 12) All setting knobs to zero.
- 13) Enter the **divisor** on setting knobs starting from the leftmost figure in position 8. See below: (*)

Carriage position	8	7	6	5	4	3	2	1
Dividend	X	X	X	X	0	0	0	0
Divisor	Y	Y	0	0	0	0	0	0

- 14) Turn operating handle until the result is lower than the dividend. This is acknowledged by a number of 9s appearing to the left of the result. (**)
 - 15) Push operating handle down (addition)
 - 16) Turn operating handle once
 - 17) Move carriage one position CW
 - 18) Pull operating handle up (subtraction)
 - 19) Repeat 14-17 until the leftmost position (pos. 1) is reached by the carriage.
 - 20) Read the **quotient** on the counter dial. Decimal point is between **nth** and **n+1th** figures from the left. (**n** = divisor's number of digits)
 - 21) Read the **remainder** on the result dial. Decimal point between position **8-nth** and **7-nth**
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Notes

(*) Steps 5 and 13; if the divisor has more than one figure, both dividend and divisor can be set at a higher position, in order to get more figures in the quotient. Both dividend and divisor can also be set at higher positions, in order to obtain quotient with more significant figures, i. e. multiplying both by a power of ten (see Example B).

(**) Steps 15-17 can be avoided evaluating by heart if the divisor is less than the first digits of the dividend.

Example A : 1234 / 56

- 1) ... 4) as above
- 5) Set carriage in position 5 (= 9-4)
- 6) Enter dividend (**1234**) with setting knobs 1-4
- 7) Turn operating handle once: result dial = **1234** in position 8-5; counter dial = **0001000**
- 8) Clear counter dial
- 9) Set one decimal marker on counter dial to the right of 4th digit.
- 10) ... 12)
- 13) Enter divisor (**56**) at position 7-8

Carriage position	8	7	6	5	4	3	2	1
Dividend	1	2	3	4	0	0	0	0
Divisor	5	6	0	0	0	0	0	0

- 14) Turn operating handle once, result = **99999995634** (negative),
- 15) push operating handle down
- 16) turn once. Result = **0000001234**
- 17) move the carriage to position 6
- 18) rise operating handle
- 19) turn twice until first two digits in the result dials become **11** (< **56**) (see note **)
 - move carriage on position 5
 - two turns until first two digits in the result dial become **2** (< **56**)
 - carriage on position 4, **20** still < **56**, then...
 - carriage to position 3, **200** > **56**
 - three turns, until **32** < **56**
 - carriage to position 2
 - five turns, until **40** < **56**
 - carriage to position 1
 - seven turns, until **4** < **56**
- 20) **quotient** on counter dial = **00220357** = **22.0357** (having set decimal point in step 9)
- 21) **remainder** on result dial = **0.0008**

Total movements : 22 handle turns and 8 carriage shifts.

Example B : 13 / 17

1) 4) as above

Multiply both numbers by 1000, **13000 / 17000**

5) Set carriage in position 8

6) Enter dividend (**13000**) with setting knobs 1-5

7) Turn operating handle once: result dial = **13000** in position 12-8; counter dial = **10000000**

8) Clear counter dial

9) ... 12)

13) Enter divisor (**17000**) at position 12-8

Carriage position	12	11	10	9	8
Dividend	1	3	0	0	0
Divisor	1	7	0	0	0

14) Turn operating handle once, result = **9999995634** (negative),

17) move the carriage to position 7

19) turn seven times until first two digits in the result dials become **11** (< 17) (see note **)

move carriage on position 6

six turns until first two digits in the result dial becomes **08** (< 17)

carriage on position 5,

four turns until **12** < 17

carriage to position 4

seven turns, until **1** < 17

as **10** is still < 17 , carriage to position 2

five turns, until **15** < 17

carriage to position 1

eight turns, until **14** < 17

20) **quotient** on counter dial = **0.7647058**

21) **remainder** on result dial = **0.0000014**

Total movements : 38 handle turns and 7 carriage shifts.