CURTA ALGORITHMS

1 A Addition / Subtraction

a **Addition** of whole numbers

b **Addition** of numbers with decimal places

c **Addition** of whole numbers when the number to be set exceeds the capacity of SR.

d **Subtraction** with positive remainder with counting the numder of terms subtracted

e **Subtraction** with negative remainder - 1

f **Subtraction** with negative remainder - 2

1 B Multiplication

a Basic **multiplication**

b **Multiplication** with constant factor

c Shortened method of **multiplication - 1**

d Shortened method of **multiplication - 1**

e Shortened method of **multiplication - 1**

f **Multiplication** with multiplicand already in CR

1 C Division

a **Division -** additive method - 1

b **Division -** additive method - 1a

c **Division -** additive method - 2

d **Division -** Subtractive method. (Useful when a result already exists in RR)

e **Successive division.** (To get a result in RR)

1 D Rule of three

a **Rule of three** - 1st method

b **Rule of three** - 2nd method

c **Rule of three** - 3rd method - Simultaneous calculation

d **Rule of three** with complementary division - Type II

e Extended **rule of three**

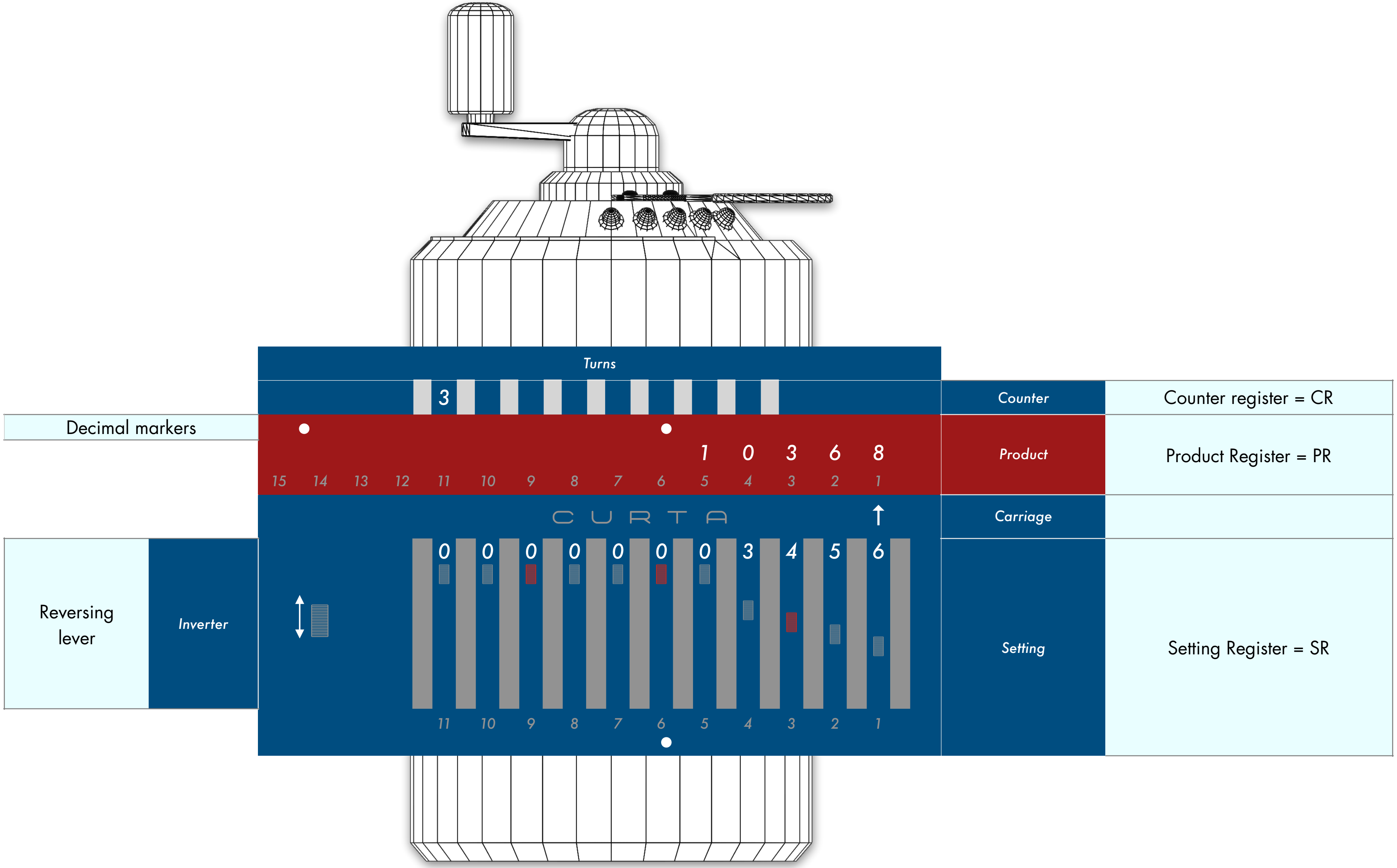
2 Roots

3 Serial calculations

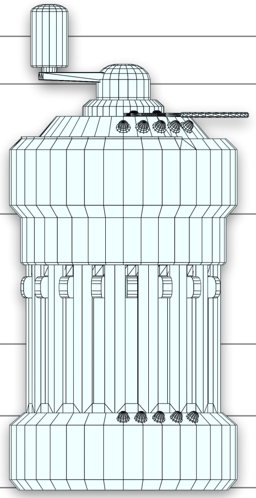
4 Geometry

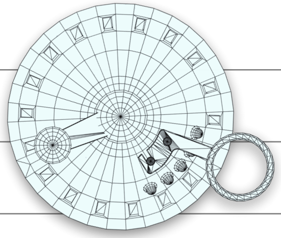
5 Statistics

6 Number games


Turns
3
Counter
Counter register = CR
Decimal markers
1 0 3 6 8
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Product
Product Register = PR
CURTA
Carriage
Reversing lever
Inverter
0 0 0 0 0 0 0 3 4 5 6
Setting
Setting Register = SR
11 10 9 8 7 6 5 4 3 2 1

Some hints... For the direct use of algorithms, it is assumed that the use of the Curta is known





Number and direction of handle turns	6 + / 1 —
Position of reversing lever	↑ / ↓
Clearing lever	Clear
Carriage position	8 7 > > 4 3 2 ▲ ▲
Setting knobs	3 0 1 7
Intermediate calculation	1 7 4 4 0 3 6 8
Overflow / underflow result	9 9 9 9 9 9 2 1 5 5 5 3
Developing number (with carriage arrow)	3 4 6 9 4 3 4 3 ▲
Note the highlighted number	2 7 2 4
Unchanged position/result/setting	- - - - - - 3 4 6 9 4 3
Expected number (end of division/multiplication	3 6 8.7 3 ▲
Result (with decimal marker and carriage arrow)	2 5 9 8 9 5 6 8 ▲

Thanks to Sean Johnston for the Curta font
and to Richard E. Deutsch / curta.li
for his support

The cards are designed to be perforated in the upper part (length) and placed in a binder

Cube root - Type II

Let $\sqrt[3]{N}$ be determined. Let us assume that we already have an approximation A. Let $\sqrt[3]{N} = A + d$, hence $N = A^3 + 3A^2d + 3Ad^2 + d^3$
By neglecting the terms in d^2 and d^3, we obtain an approximation d_1 for d and consequently an approximation R for $\sqrt[3]{N}$
$d_1 = (N - A^2) \div 3A^2$, $R = A + d_1 = A + (N - A^3) \div 3A^2$ (The error is practically $d_1^2 \div A$) This expression is easily calculated using the Curta

	$N = 560$, $A = 8.24$, $\sqrt[3]{560} = ?$	Setting	Carriage/Inverter	Turns	Counter	Product
	$\sqrt[3]{N} = A + (N - A^3) \div 3A^2$	Clear	↑		Clear	Clear
1	Set the initial approximation A = 8.24 Calculate A^2: Develop A in CR	824	8 7 6 5 4 3 < 1	14 +	8.24	678976
2	Set A^2	678976	3		824	678976
3					Clear	Clear
4	Calculate $3A^2$ .Develop 3 in CR. In PR, we obtain $3A^2$ Note this number	67.8976	8 7 6 5 4 3 2 1	3 +	3	203.6928
5	Calculate A^3 Develop A in CR. A^3 in PR	67.8976	8 7 6 > 4 3 2 1	7 +	8.24	559.476224
6	Set $3A^2$	203.6928	8 7 6 5 4 3 2 1	+	8.25	561.513152
	Calculate $A_1 = A + (N - A^3) \div 3A^2$ Division by additive method. (See 1Ca) Develop PR as close as possible to N	2036928	4	–	824	559476224
		2036928	3	2 +	8242	5598836096
		2036928	2	5 +	82425	559985456
7	Result: 8.24257	203.6928	1	7 +	8.24257	559.9997144 96

Source: " Curta exemples de calcul ", Contina / Bernard Stabile - 2023