When was your Curta made?

Formulae for calculating when a particular serial number Curta calculator was made have been published on the web, particularly on Rick Furr's excellent site (http://www.vcalc.net/cu.htm).

However those I've seen seem to assume a constant rate of manufacturing calculators, a scenario extremely unlikely, and indeed contradicted by other information on Rick's site ("Facts from Rick") stating:

- *In 1949, only 300-400 Curtas were made each month.*
- *By 1952, 1,000 Curtas were made each month*

The source of these numbers is not given, but I'm going to use them as if they're 'gospel'. Other pertinent facts (again from Rick's site, with minor edits) are:

- *Curta I's were produced from 1947 to 1970.*
- *Curta II's were produced from 1954 to 1970.*
- *The last Curta was made in November 1970*
- *There are ~ 80000 Curta I and ~ 70000 Curta II machines.*

The consensus from various websites seems to be that the number of Type 1's manufactured was about 78,000 and about 70,000 for Type 2's, so they're the figures I'm running with. I'm going to assume that the production rate in 1947 was zero, and start counting from 1948. Likewise I'm taking as gospel that production finished in 1970, so the rate for 1971 is zero.

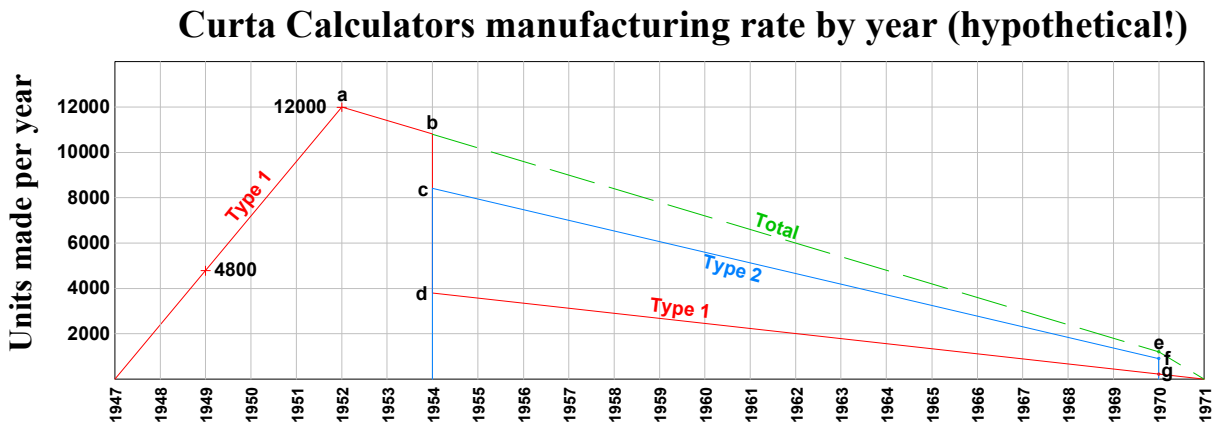
Crunching these overall numbers produced, we get an average production rate for Type 1 of 3,391 units per year (for 23 years), and for Type 2 an average rate of 4,118 units per year (for 17 years).

So what am I doing differently from the 'constant rate' exponents? I'm going to assume that the overall production rate increased linearly from start of production until a peak was reached, then declined steadily (linearly) from then until cessation of production in 1970. Furthermore, I'm going to assume that when the Type 2 was introduced, the existing production line capacity was initially split between the two models (i.e. the **total** manufacturing rate did not increase).

Note carefully my use of the word '*assume*' in the previous paragraph! This whole issue of 'calculating' a manufacturing year from a serial number is based on **big** assumptions! I really have no idea of how the manufacturing rate changed over the years (does anyone have Contina's annual production accounts??). All I'm doing is taking the scant and imprecise Curta information bandied about and extrapolating it (dangerously!) according to how I might have made manufacturing decisions had I been Contina's Manufacturing Manager at the time!

In the real world production rates very rarely change in a linear fashion. In the pre-automation world, rates were typically increased by either adding workers to an existing production line, or adding a whole new line (with many new workers). In either case the increase is a step (small or large), and both the period between such steps and their size are rarely regular. But what can I do in the absence of Contina's accounts – *assume*, *smooth* and *extrapolate*!

So here's my approach to the problem…



In order to visualise my assumptions, I've plotted them in a rough graph (above).

Why has the production rate in 1952 been specifically mentioned in Rick's notes? Could it be that this was the year with the highest production rate throughout the history of Curta manufacture? I'm going to assume so, and thus my point 'a' in the graph above shows this peak annual production rate. From there I assume the total production rate declines steadily until point 'e' (in 1970) when production ceases completely. The other 'known' point marked is 4800 units per year (400/month) in 1949.

In 1954 I've assumed (as mentioned earlier) that existing production capacity was split between the two models, so Type 1 drops to 'd' and Type 2 starts at 'c' per annum. From there I've assumed Type 1 production rate changes linearly till it reaches zero in 1971 [i.e. 1970 is the last year with non-zero production rate, viz. 'g'] (the majority of Type 1's [somewhat over 47,000] would have been produced before 1954, based on the above graph, so the rate for the much longer production period after that has to be pretty low), while the Type 2 rate also changes linearly to 'f' in 1970, when all production stops.

Looking at the shape of the **total** (Type 1 + Type 2) production rate (above), it seems sort of reasonable… Production ramps up quickly during the first several years, as the product becomes known and appreciated around the world, then as the market nears saturation the growth rate declines to match ongoing replacement and new sales. In 1967 the first electronic pocket calculator was released (by Texas Instruments, I believe), but Contina may not have noticed its impact for a few more years, when they saw the writing on the wall and stopped production. By this time a considerable inventory had probably been built up (presumably due to rapidly declining sales because of the electronic competition), which reputedly took some further three years (to about 1973) to be largely sold off.

Sounds reasonable, doesn't it? But remember, it's all purely **hypothetical**!

We 'know' the value of 'a' (12,000), so all we need to do now is calculate 'c', 'd', 'f' and 'g'. I'm not going to bore you with the maths (you're sick of school algebra, right? ☺), but the answers come out as, c = 7,383, d = 3,401, f = 852 and g = 201 (b = 10,784 and e = 1053). As well as these end-points, slopes of the various straight-line segments have been calculated, and used to produce a formula for each straight-line segment, so the (hypothetical) production rate for any given year can be calculated.

"OK, so how do I calculate my machine's year of manufacture?" you ask. Well, all we have to do is integrate the above graphs to find the cumulative units produced, and we're almost there. Uh oh, differential calculus not your strongest subject at high school? Mine neither, but we'll muddle through it somehow.

In fact we'll just do a simple numerical integration, using the production rate for each year as an average for that whole year, and adding the number of units corresponding to each year's rate. By entering the derived formulae into an Excel spreadsheet, the rest of the number-crunching is done for us.

The resulting numbers are shown in the following table (pasted from the Excel spreadsheet). Keep in mind the Type 1 ("T1") serial numbers started at '1', while the Type 2 ("T2") serial numbers started at 500,000. "T1 S/N EOY" means "Type 1 serial number at end-of-year", etc.

Year	T1/year	T2/year	T1 total	T2 total	Grand total	T1 S/N EOY	T2 S/N EOY
1948	2400	0	2400	0	2400	2400	
1949	4800	0	7200	0	7200	7200	
1950	7200	0	14400	0	14400	14400	
1951	9600	0	24000	0	24000	24000	
1952	12000	0	36000	0	36000	36000	
1953	11392	0	47392	0	47392	47392	
1954	3401	7383	50793	7383	58176	50793	507383
1955	3201	6975	53994	14358	68352	53994	514358
1956	3001	6567	56995	20924	77919	56995	520924
1957	2801	6158	59796	27083	86879	59796	527083
1958	2601	5750	62397	32833	95230	62397	532833
1959	2401	5342	64798	38175	102973	64798	538175
1960	2201	4934	66999	43109	110108	66999	543109
1961	2001	4526	69000	47634	116634	69000	547634
1962	1801	4117	70801	51752	122553	70801	551752
1963	1601	3709	72402	55461	127863	72402	555461
1964	1401	3301	73803	58762	132565	73803	558762
1965	1201	2893	75004	61655	136659	75004	561655
1966	1001	2485	76005	64139	140144	76005	564139
1967	801	2076	76806	66216	143022	76806	566216
1968	601	1668	77407	67884	145291	77407	567884
1969	401	1260	77808	69144	146952	77808	569144
1970	201	852	78009	69996	148005	78009	569996

So, to find your calculator's (hypothetical!) year of manufacture, look down the appropriate "Tx S/N EOY" column until you find the **first** year with a S/N equal to or larger than yours, and the year in the left-most column of that row is your manufacturing year. Maybe (give or take a few years)!

Incidentally, the reason the total numbers made (for Type 1 and 2) don't come out as **exactly** 78,000 and 70,000 (my starting assumptions) is due to my numerical rounding of the slopes and end-points of the straight-line segments.

To try to refine this method to determine a **month** of manufacture (as some people do!) is patently ludicrous, give the huge assumptions and approximations made in developing these figures. Consider yourself lucky if you find out your manufacturing year to within a few years! Is it important anyway?