

The Development of the Magic Brain Calculator

When I was in grade school, way back in the early 1960's, my parents bought me a Magic Brain Calculator to help me with my homework. At the time, I thought that it was the best thing since sliced bread. I even had one with me in high school in the late, late 60's (I also had a slide rule). However, by the time I got to college, electronic handheld calculators were available and I eagerly adopted the new technology and really didn't think about the mechanical adder again for thirty years.



In early 2004, I was on eBay when I stumbled upon a Magic-Brain Calculator for sale. I waxed nostalgic and bought it. I then began to wonder about the history of the Magic-Brain and how it came to be. That was the first time that I became aware of the long and complicated history of the Slide Adder. I also learned about the truly beautiful craftsmanship of the Addiators. These high quality machines put the poor tinplate and plastic Magic-Brain to shame. I sadden me to learn that demise of these fine calculators in the 60's was mainly the result of the cheap mass-produced Magic-Brain dominating the market. (Although Addiator was able to continue production in a few niche markets until the mid 70's.)

So, the primary thrust of this work is to answer the question: Whence the Magic-Brain?

As with any theory of a historical nature, there are many questions that I don't have the answers to – that may not have an answer at all. And there are, no doubt, many things that I think are true, that just aren't. I have tried very hard to base all my speculations on some concrete observation.

With each new addition to my collection and with each new photo spotted on the Internet, I acquire new data that fills in some blank and sometimes contradicts conclusions that I had previously formed. So, I expect that my theories will change many times as time goes on.

In the next section, I'll go over the design attributes of the Slide Adder and point out some of the features that I think are salient to figuring out where these guys come from.



Here are the front and back of an Addiator and a Magic Brain.

All slide adders also perform subtraction. At the mathematical heart of this subtraction is the concept of complementary addition. (Go to <http://courses.cs.vt.edu/~cs1104/BuildingBlocks/TwosComplement/TensDemo.htm> to see a good demonstration on how to do the math and why it works). When it comes to slide adders there are 4 basic ways to implement the complementary addition algorithm.

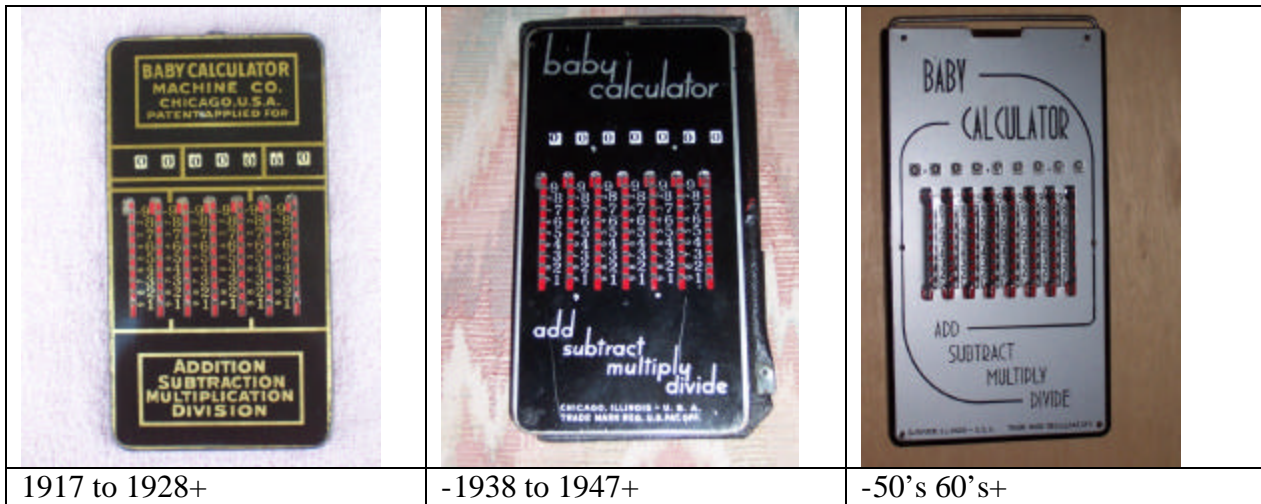
- 1.) Put the complementary numbers on the backside of the adder inverted. Then the process of addition on the backside performs the subtraction on the front side. Most of the Addiators used this method. The complexity of the algorithm is pretty well hidden by the intuitive mechanics.
- 2.) Put the Complementary numbers on the separate lower section of the adder. This saves the trouble of having to turn the adder over and flipping. The complementary nature of the subtraction is apparent and simple to perform. This was the method used in the Addiator Arithma and the Produx style of calculators.
- 3.) Ignore the separate subtraction section altogether. Put the complementary digits on the columns along with the addition numbers and rely on the user to implement the algorithm correctly. The early Baby was set up this way.
- 4.) Merge the Upper and Lower sections (as in 2.) into just one section but:
 - a. Provide a device to flip from addition mode to subtraction mode. This was the method used by the Correntator, the TRICK, Exactus MiniAdd, and the Arithmometer. This allowed the adder to be more compact but it meant having a movable part that was sometimes balky and sometimes prone to breaking
 - b. Ignore the device and rely on the operator to keep straight the addition versus the subtraction rules. I believe that the Kalkometer was the first adder to use this method. There were many advantages to this method from a construction viewpoint. The adders could be relatively compact. They didn't require the high precision of the Addiator or the delicate construction of the Correntator. They could use plastic for much of the needed materials.

4b. is the method used by Kalkometer, adopted by Baby, used by Wizard and all the Magic Brains that followed.

The “Baby Calculator”

The Calculator Machine Company made the Baby. The company was located in Glenview, Illinois - a part of Chicago - until sometime around 1954, when the company moved to Huntingdon Valley PA – a part of Philadelphia.

There are three basic styles of Baby. The first two differ for the most part in the paint job. But the third is a radical departure in construction. The older Babys were sometimes sold attached to a leatherette flip case and sometimes in a leatherette pouch. The newer Baby was sold in a soft faux leather pouch.



WORLD'S LOWEST PRICED
ADDING MACHINE
 VEST POCKET SIZE
 IDEAL FOR BUSINESS OR PERSONAL USE

FREE TRIAL
ONLY \$2.50
 TOTAL COST
 SEND NO MONEY

Each Baby Calculator in beautiful, rich-looking leatherette case - at no extra cost. **FREE!!!**

Fits vest pocket or purse. Guaranteed accurate. Operated as easily, and as reliable, as machines costing many times as much. Not a toy. Substantially made of 28-gauge steel—guaranteed for life against defects in construction. You positively can't buy a calculator of equal quality for as little money. **ACCEPTED AS THE FINEST LOW PRICED CALCULATOR FOR OVER 30 YEARS!** Operates with a flick of your finger. Adds, subtracts, multiplies, divides—counts up to ten million. Pays for itself over and over in mistakes avoided, and time saved. **MAKES IDEAL GIFT.** Sold on a positive money back guarantee. Send only \$2.50. Calculator sent postpaid, or send name and address and pay postman \$2.50 plus postage. **MONEY BACK IN 10 DAYS IF NOT DELIGHTED!** (If outside U. S., send \$3.00.)

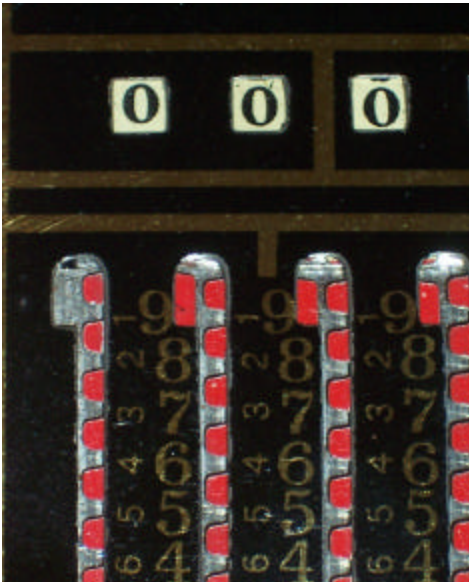
AGENTS WANTED.
CALCULATOR MACHINE CO. (Mfrs.)
 Dept. 191, P. O. Box 248, Glenview, Illinois

I'm not sure when they started productions but based on a statement in an ad that I found copied on the internet the Baby at the time was over thirty years old. The stated source of the ad was a 1947 Popular Mechanics. That put the initial year at circa 1917. There are markings on one of my old style “Baby”s that indicate it was from around 1928. The middle Baby has a mailer box with stamps that were issued in 1938/39. So, sometime after 1928 but before 1938, the design was changed to the middle baby. That design existed until, at least, 1947. Sometime after 1947, the design was to the plastic backed with faceplate design.

Across all three designs there are some common features.

- The number displays are square. Most (all?) of the other slide adders of the period have round displays.
- The sliders are painted red for numbers to be pulled down and white for up and over. All others were reversed or had other markings.
- There are no numerals for the left hand slider
- The carry over ‘hook’ is not a shepherds’ hook shape but an open box

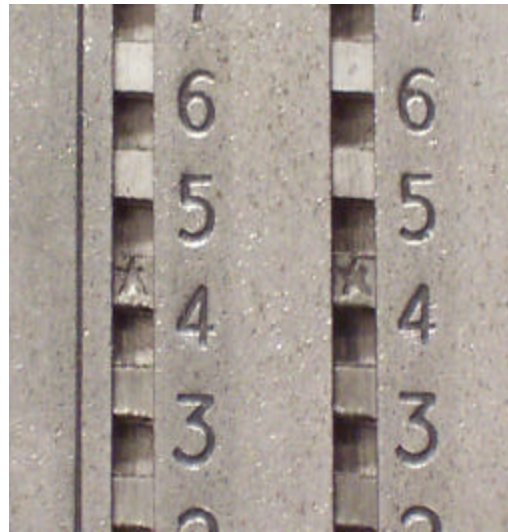
It is not clear if the Baby was an original design or a copy. At first, I thought that it was a variation from the MEUM but it turns out that the MEUM was only a prototype and never went into production. Perhaps the square display came from the Golden Gem. Which predates the Baby by about 10 years and was very popular.



Note that the baby does not use the 'Shepard hook' design to perform the carry-over function. The 'hook' is open. In the old 'Baby' designs the carry-over function was only at the top – in the newer design the 'hooks' were at both the top and bottom.

Curiously, at one point the company that made the 'Baby' also marketed the Golden Gem. They would offer to people that had purchased a 'Baby' full credit for the price of the calculator against the purchase of a Golden Gem if they would mail in the old 'Baby'. The price of the Golden Gem was \$10.00 and the price of the 'Baby' was \$2.50.

The Arithmometer



A “Gray” and a “Tasco” Arithmometer.

The “Tasco” was produced and sold well into the 60’s

Friedrich Diestelkamp informs me that this design is exactly the same as a “TRICK” from Germany. The distinguishing feature here is the sliding shield that aids in subtraction.

There are a few minor cosmetic variations from the older Gray to the newer Tasco:

- Chrome plating
- The styles of the fonts on the name Arithmometer are different.
- The Gray has an asterisk to mark up/down. The Tasco has the slide painted red for addition carry over.
- The Gray is engraved “The Gray Arithmometer Corp. Ithaca NY”. No such engraving appears on the Tasco.

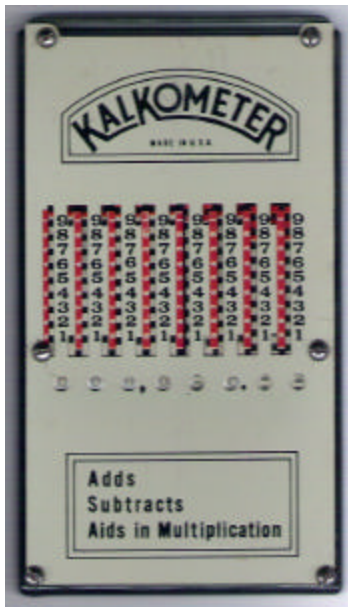
The change from Gray to Tasco happened sometime between 1941 and 1945. What exactly the relationship was between Gray and Tasco is unknown to me. Tasco may have bought the complete production facility or they may have just bought the Trade Mark and had Gray continue making the Arithmometer for them.



On the back of the Gray is a sticker that has the Morse Chain Co. logo. I have not been able to find out anything about this Company so they may have been involved with the production of the calculator or they may have just slapped the sticker on the back to use as a promotion item.

The Kalkometer

It is my belief that the Kalkometer is the very first slide adder to use the faceplate on a plastic back design. The reason that I think the Kalkometer is the first is that some Kalkometers used screws to affix the faceplate onto plastic back. This had to have been expensive compared to using rivets. And since it later became a universal practice to use rivets to hold the faceplate on, the implications is that this was the initial design. Other Kalkometers used rivets, so it is reasonable to assume that these are later models.

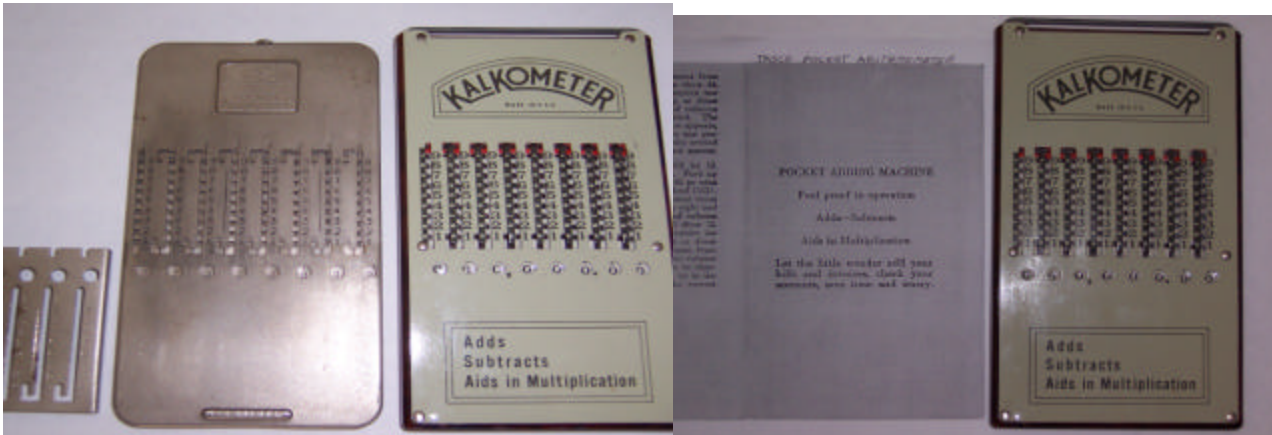


Special thanks to Wayne Rickard for the scan of the early KalkoMeter.

Another indication that the Kalkometer was first comes from the design of the plastic backing. The back is of a single thickness. This used more plastic than was really necessary. The Baby version used less plastic by decreasing the thickness of the plastic in the top half. The Wizard removed the excess plastic from between the slide channels saving even more plastic.



I'm convinced that the Kalkometer was a modification of the Arithmometer. The primary clue is the similarity in stamping of the faceplate. The width of the Arithmometer is exactly same as the metal part of the Kalkometer and the stamping for the Kalkometer is exactly the same design as the Arithmometer. (However, the spacing of the sliders in the Arithmometer is 1.11 cm and in the Kalkometer it is 1.0 cm. This extra spacing gives room on the sides for the different style reset mechanism. The Kalkometer is fundamentally an Arithmometer (or a Trick) without the shield. As discussed above this innovation merely put the onus on the user to keep straight what operation he was performing rather than rely on a physical barrier.



A second clue is that the slogan “Adds”, “Subtracts” and “Aids in Multiplication” comes from the “Tasco” Arithmometer instruction sheet. I’m looking for a “Gray” instruction sheet to see if it goes back that far. Another clue is that the names are same “ometer” ending.

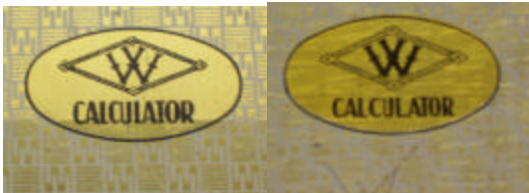
At the Computer Collector website ([COMPUTER COLLECTOR - Kalkometer](#)) there is documentation that associates the Kalkometer with the Precision Instrument Company of New Jersey. However, it is not clear if they were just a distributor of the calculator or the manufacturer. I have found no other indications of the origin of the Kalkometer.





The Wizard indicates that it was made in West Germany. This puts the date after 1949. I have seen ads for the Wizard in magazines dated 1959. The design is very similar to the Baby but with plastic clips added to the side to hold the stylus. It also has a bend in the reset handle. I suspect that the clips are the Wizard innovation.

A variation of the Wizard was the W. It was also made in West Germany. This has three clips instead of the four clips with the Wizard. The PIC is West German. Reportedly identical to the 'W'



The MAGIC BRAIN

I suspect that the Magic Brains were not so much manufactured as they were assembled. I have seen four variations of the plastic backs and two (perhaps three) variations on the faceplate. The backs differ in the positioning of the clips and how the country of origin is marked. Most have the top set of clip at just about the same level as the word “MAGIC – BRAIN” and the lower set clip just below the sliders (see the Chadwick). Others have the clips lower down with the top at just about the display level (curiously, if you rotate one the calcs and the clips will just about line up from one style to the other. This may just be coincidence or it could be that the injection mold was created using an inverted original.). The other variation has the phrase ‘Made in Japan’ and others have just the word ‘Japan’.

The big variation in the faceplate is the degree that the slider covers are bent down. One style has the metal bent at a 90-degree angle. The metal edge rests on the top surface of the back plate. This gives support to the faceplate and forms a channel to keep the sliders from moving too much to the right but they are somewhat free to move to the left. The other variation is to bend the metal at about 45 degrees. This allows the sliders to slip to the right more but not a lot and it keeps the sliders from moving to the left a lot. In either case, there is a massive amount of slop in the slider movements compared to the better made German machines.

What does vary a lot is the paint job on the faceplate and the type of rivets that are used.



The Magic Brain Instruction Sheets.

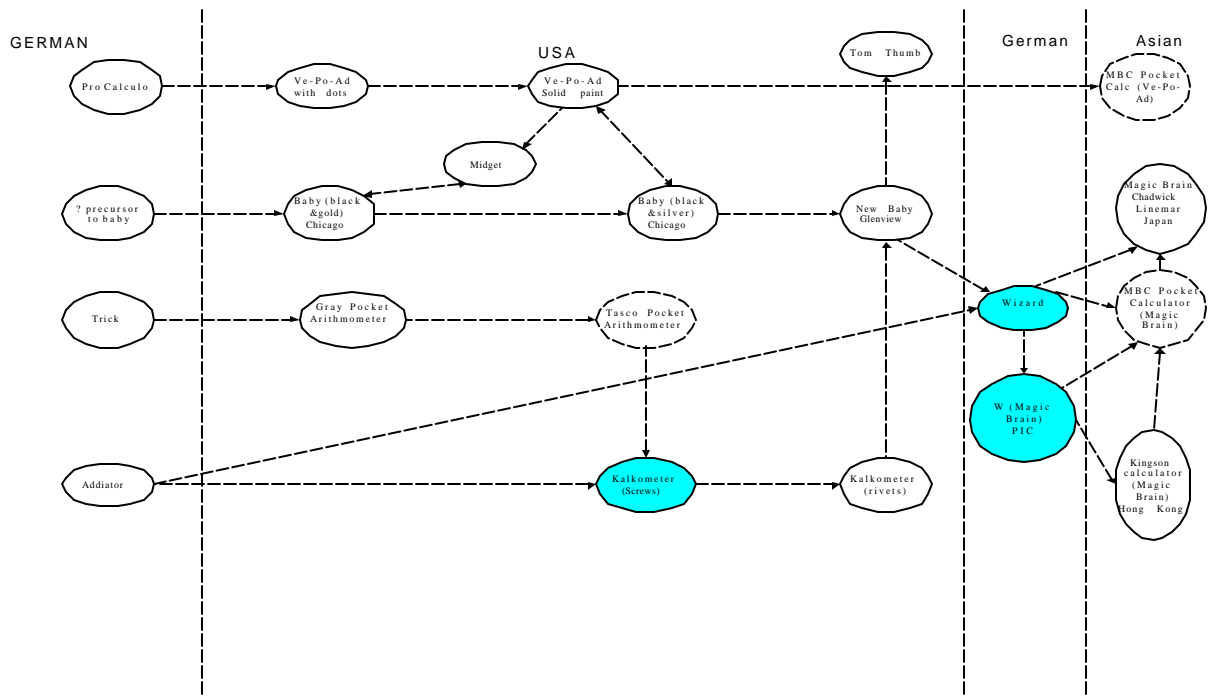
Although comparing physical attributes, the real key to the origin of the Magic Brain was the instructions sheet. The instruction sheets changed over time. The very first Magic Brain was actually labeled a “W”. It came in a box with Magic Brain on it and it came with an instruction sheet that was just the inner pages of the Wizard calculator. I suspect that Chadwick made the Japanese “W”. There was also a Magic Brain from Chadwick that had the same instruction sheets as the “W” – that is the instruction sheet was from the Wizard.

For the typical Magic Brain they all used a variation of the Simplified Instructions. The earliest prints the instructions on just one side of a 4-inch by 10-inch piece of paper. Later a double-sided instruction sheet replaced this. Typos appear in the later versions of the double-sided instructions – for example, “Clear” is misspelled “Cllear”.

So the progression is now clear. The KalkoMeter was derived from the Arithmometer. The Baby adopted the new plastic back and tinplate design with the combined top and bottom carry over feature. This new Baby design was then modified to become the Wizard. The Wizard was modified to become the “W”. The “W” was then reproduced in Japan. The company Chadwick then produces a true Magic Brain Calculator that has the Wizard instruction sheets. The basic design of the Magic Brain is then adopted and produced by other companies.

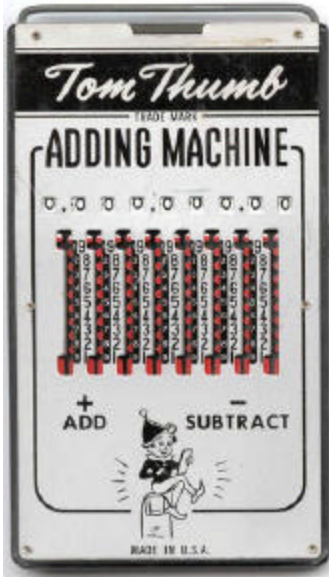
The Influence Diagram

In order to summarize which calculators influenced which calculator, I drew what I call an influence diagram. I hope that it shows the cast of characters in our little drama, who played a lead role and who played a bit part.



The Tom Thumb

The Tom Thumb is identical to the Baby except for the paint job. The Tom Thumb came painted yellow or silver. The instructions for the Tom Thumb are taken directly from Baby, except for the section on Multiplication – that section used the directions from the KalkoMeter.



This bit of mixed plagiarism means that the Tom Thumb post-dates both the Baby and the Kalkometer.

The most famous Tom Thumb trademark was the property of the Western Stamping Company of Jackson Wyoming, who made a wide range of Tom Thumb toys – cash registers, typewriters, ovens, etc. So, it is entirely reasonable to assume that they made or marketed the Tom Thumb Adding Machine. However, the construction of the Tom Thumb is exactly the same as the Baby. Plus

advertisements for the Tom Thumb give a PO Box listing in Philadelphia – which is close to Huntingdon Valley where the Baby was made. The first ad for the Tom Thumb to appear in Popular Mechanics was in February 1959 and there was a major drop off of Advertisements for the Baby. The only ad for a Baby in 1959 was in November – but there were no ads for the Tom Thumb that month.

At this time, I think that the Calculator Machine Company faced with increasing price pressure from the German and perhaps Japanese, decided to produce two brands of calculators in parallel. The more expensive Baby and the cheaper Tom Thumb. The more expensive Baby didn't last very long and only the Tom Thumb was produced into the early 60's.

Other Slide Adders but not in the direct line of decent of the Magic Brain

Here are some examples of French, German and English slide adders. Although, these are very nice machines and deserve close examination in their own right, they really have played a limited roll in the development of the Magic-Brain.



The MBC Calculators

This is a unique set of calculators from a company called MBC. I have found three MBC Calculators; each is named a POCKET Calculator and has a heavy black and silver design. The designs are obviously 'borrowed' from the Ve-Po-Ad (Pro Calculo!), the Magic-Brain, and the Arithma. Each of them uses the single, wide sheet version of the Magic-Brain instructions (no typo version). Since they each have the same patent numbers and pat pending numbers, I suspect that the patent numbers are really bogus and are there just for marketing.



The Pocket Calculator in the Magic Brain style is not made from the typical molds. The back shows the MBC logo and the 'Made In Japan' in the middle of the back. They also use a black plastic instead of the typical pink or read. .

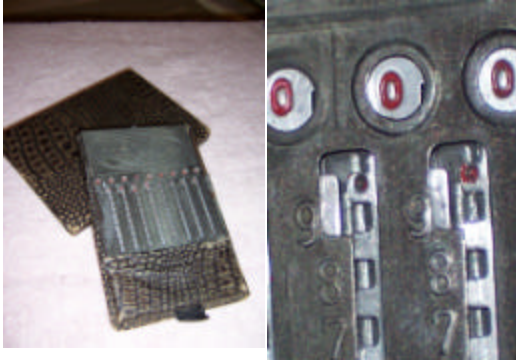


The Ve-Po-Ad version is very well made and has a number of markings on it showing proper usage. Note that unlike the Ve-Po-Ad this calculator has the subtraction carry over feature similar to the Magic-Brain except that with the Magic-Brain style the slide blocks the stylus when the number to the left is zero but with this calculator there is no blockage (or teeth).



This photo of the MBC shows it with an instruction sheet that is from the Magic Brain. This is strange because the instructions for a Magic-Brain style don't work for this 'Arithma' style of slide adder.

The Pro Calculo! Family



The Pro Calculo came in a nice snakeskin cover. In the detail picture note the dots on the sliders. The Ve-Po-Ad is identical with Pro Calculo except snakeskin slipcover is replaced by leatherette flip case and embossing replaced by paint. Later versions of the Ve-Po-Ad replaced the painted dot with completely painted slider but curiously the instructions still referred to the dots.

The NU AD calculator was made in the instruction manual this was Ad.



Kansas City. Based on the design of perhaps the precursor of the Ve-Po-



The Ve-Po-Ad sold for \$2.95. This compares to the \$2.50 for the Baby.

An early model states that the Reliable Adding Machine Company made it. Later models are made by the Reliable Typewriter and Adding machine Company in Chicago. But by then they had moved a few blocks south



The Midget has the same basic design but it was more cheaply made. The Paint job on this one is out of alignment – numerals don't lineup with slider correctly. The metal tabs are folded directly through flip case. They used the instruction sheet from Ve-Po-Ad and just substituted "Midget" for "Ve-Po-Ad". The nail may or may not be original stylus. I suspect that the Midget was a low cost version of the Ve-Po-Ad meant to compete with lower price Baby – this is hinted at by the "Addition Subtraction Multiplication Division" slogan. No guarantee was offered with the Midget.



This Pocket Calculator was made in Japan by MBC. It is mechanically identical with Pro Calculo family except for the subtraction carry over feature.

None of the distinguishing features of the Pro Calculo family seem to have been adapted in to the Magic Brain.

