CHAPTER
15

Prologica and the National Informatics Policy

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ABSTRACT
The purpose of this article is to talk about Prologica Computadores, one of the largest microcomputer and peripheral manufacturing companies in the 1980s, which had its peak during the Brazilian Market Reserve (Federal Law 7232/84), its main products, R&D, reverse engineering, and the entire structure of several complementary companies.

Keywords: Prologica, National Informatics Policy, Federal Law 7.232/84, R&D, Reverse Engineering.

1 INTRODUCTION

1.1 PNI AND MARKET RESERVATION

On October 29, 1984, the National Congress passed Law No. 7,232, known as the National Informatics Policy (PNI). Intended to last eight years, the law aimed to stimulate the development of the computer industry in Brazil by creating a market reserve for domestic companies.

The idea of creating a market reserve for national manufacturers of computer products emerged in the first half of the 1970s, during the Military Regime. The justification was that, protected from competition with multinationals in the sector, Brazilian manufacturers could develop national technology and compete on equal terms with foreign competitors when the reserve ended.

The defenders of the measure cited historical examples of successful protectionism, such as Japan and the United States. To implement the Informatics Law, the government created the SEI (Special Secretariat for Informatics), controlled by colonels connected to the National Information Service. This generated protests from the more liberal segments of the business class.

The only foreign company that obtained authorization from the Brazilian government to commercialize microcomputers in the country, at this time, was Hewlett-Packard, with its HP85B model. The only restriction placed by the government was that the machine could only be traded for technical-scientific applications, but not for commercial purposes

However, the Informatics Law was supported by entities in the sector, such as ABICOMP (association of national computer manufacturers), Brazilian Computer Society (representative of university professors of informatics) and APPD ("officious" union association of data processing technicians). Thanks to the work of these entities, many sectors of civil society welcomed the Market Reserve.

In Congress, Severo Gomes and Cristina Tavares enthusiastically supported the measure, while Roberto Campos opposed it, denouncing the potential negative effects of protectionism. Campos filed a lawsuit for the declaration of unconstitutionality against the law in the Supreme Court, but the petition was considered inept based on the contrary opinion of the attorney general at the time, Sepúlveda Pertence.

Initially it was to be valid for 8 years from the date of enactment (so it should last until October 1992), and after this period the national companies would theoretically be on an equal footing with foreign ones. However, its end was anticipated in one year and, in October 1991, the then president Fernando Collor sanctioned the Federal Law no. 8.248/91, which modified the National Informatics Policy by changing the concept of national company, which in practice put an end to the Market Reserve.

> "The adoption of an industrial policy for computer manufacturing in Brazil from 1977 to 1990 remains in the Brazilian imagination as a failed experience. Soon after its abandonment in 1990, it was common to attribute to the so-called market reserve all the ills of the computer sector, in addition to various ills that appeared in other sectors, such as, for example, the technological backwardness of automobiles manufactured here. Even today we still hear references to market reserve as a kind of stupid crime. A closer follow-up of events shows, however, that a few years before its condemnation, market reserve also appeared as a worthy and surprising success. The technological and economic achievements were not small: in the early 1980s, Brazil was one of the few countries in which companies under local control were able to supply a significant part of the domestic market for minicomputers with their own brand name and technology. Teams of Brazilian engineers and technicians had absorbed the technology of originally licensed products and effectively conceived and designed complete systems (hardware and software) of minicomputers and various other computing artifacts, placed on the market by Brazilian companies with economic and technical success". (MARQUES, 2000)

> Prologica, like many others, benefited during the 1980s from the Market Reserve Law, which prevented the import of foreign computers if there were similar ones in Brazil. The lack of competition, however, was considered unhealthy and a certain delay in Brazilian computer centers was the result of this polemic policy, which ended up being relaxed starting in the 1990s. Thus, with the opening of the market since the Collor government, most Brazilian computer companies were not competitive and ended up closing their doors or being sold. (Wazlawick, 2017)

2 BIRTH AND FOUNDATION

Prologica Computadores was founded in 1976 by Leonardo Bellonzi, an Italian with Brazilian citizenship who owned an electronic components store (FILCRES), and Joseph Blumenfeld, who was French and became the technical director of the new company. Later they were joined by Stellamare Fassy Bellonzi, Leonardo's mother, who began as financial director, and the engineer Geraldo Cohen, as well as Carlos Roberto Gauch who was responsible for Marketing.

The company initially sold accounting machines such as the MCA-100 and Alpha Disk. The company later specialized in producing products similar to the Sinclair ZX-81, Tandy TRS-80 and Tandy TRS-80 Color Computer II micros. These computers started with the abbreviation CP (for

Personal Computer) followed by a number. Its biggest success in the market was the CP 500 micro, compatible with the Radio Shack Tandy TRS-80 Model III.

Prologica Logo

(Fonte: Datassete)

Prologica became a master sponsor of Christian Fittipaldi in his Karting days, below Christian Fittipaldi and Rubinho Barrichelo.

Christian Fittipaldi and Rubinho Barrichelo.

(Fonte Motorsport.com)

Prologica has also sponsored SuperKart championships in Brazil. Superkart are high-speed go-kart competitions.

1983 SuperKart race

(Source MV Informática - https://www.velasco.com.br)

1983 SuperKart race

(Source MV Informática - https://www.velasco.com.br)

3 PRODUCTS

3.1 SISTEMA 700 (SYSTEM 700)

Prologica's first major release to the consumer market was in 1981 with Sistema 700.

This is the model based on two 4 MHz Zilog Z-80A processors, one for main processing and one for peripheral activities and two 51/4.

Prologica Sistema 700

(Fonte:Wikipedia)

Its operating system was DOS-700, a version adapted by Prologica's software engineering department from the CP/M-80.

Its keyboard is a full electromechanical type, incorporated in the central unit's cabinet.

The video monitor is a monochrome, green phosphor, 12" monitor built into the central unit enclosure. It represents text in the format of 24 lines by 80 columns, in upper and lower case characters, the upper right corner of the screen could be used to continuously display a digital clock, with hours, minutes and seconds.

The central unit is entirely contained on a single board, which comprises the keyboard circuitry, the CPU, the main memory, and the I/O (Input and Output) controllers. The CPU has two 8-bit Z 80A microprocessors operating at a clock speed of 4 MHz: the first microprocessor is the CPU itself, performing all processing and video-related functions, while the second is in charge of the control routines for disk I/O operations. (FIPP/FACOP. 2016)

The memory is divided into three: a 64 Kbyte RAM (non-expandable) for programs, another RAM, of only 2 Kbytes, for communication between the two microprocessors, and a 2 Kbyte EPROM, intended for basic control of the peripherals and bootstrapping.

The central unit includes all the peripheral controllers (video, keyboard, printer, and disk), and has rear connectors for connecting them. In addition, there are two serial communications ports of the

RS-232C type, capable of asynchronous communications with programmable speed between 50 to 19,200 bauds, and synchronous, with speed of 1,200, 2,400, 4,800 and 19,200 bauds.(FIPP/FACOP. 2016)

The standard auxiliary memory, supplied with the basic system, consisted of two 5.25-inch, single-sided, double-density diskette drives with a formatted capacity of 350 Kbytes per diskette. The drives are built into the central cabinet, in a vertical position, on the right-hand side. Optionally, two double-sided drives with a capacity of about 700 Kbytes could be purchased instead of the single-sided drives. To expand the mass memory capacity, there was also the possibility of using up to four 8-inch floppy disk drives, with IBM 3740 standard (density and single face, 256 Kbytes per disk), or double face and double density drives, with approximately 1 Mbyte per floppy disk. Another possibility was to connect to System 700 an external module with a Winchester-type hard disk, called SuperFile, with a capacity of 5 or 10 Mbytes. (Velasco, 2018)

It has achieved relative commercial success in financial, database, and engineering applications. Due to compatibility with the popular CP/M system and its many applications such as Fortran ANS, BASIC compiler, COBOL ANSI 74 compiler, Algol, Pascal, PL/I, MUMPS/M, RPG, Faturol C could be used.

Other applications like word processors (WordStar), spreadsheets (CalcStar) and databases (DataStar and dBase II) were also compatible. Its applications could be programmed in BASIC, Cobol-80 and Fortran languages.

It was a clone of the Intertec Superbrain computer released in 1979 in the USA.

Intertec Superbrain

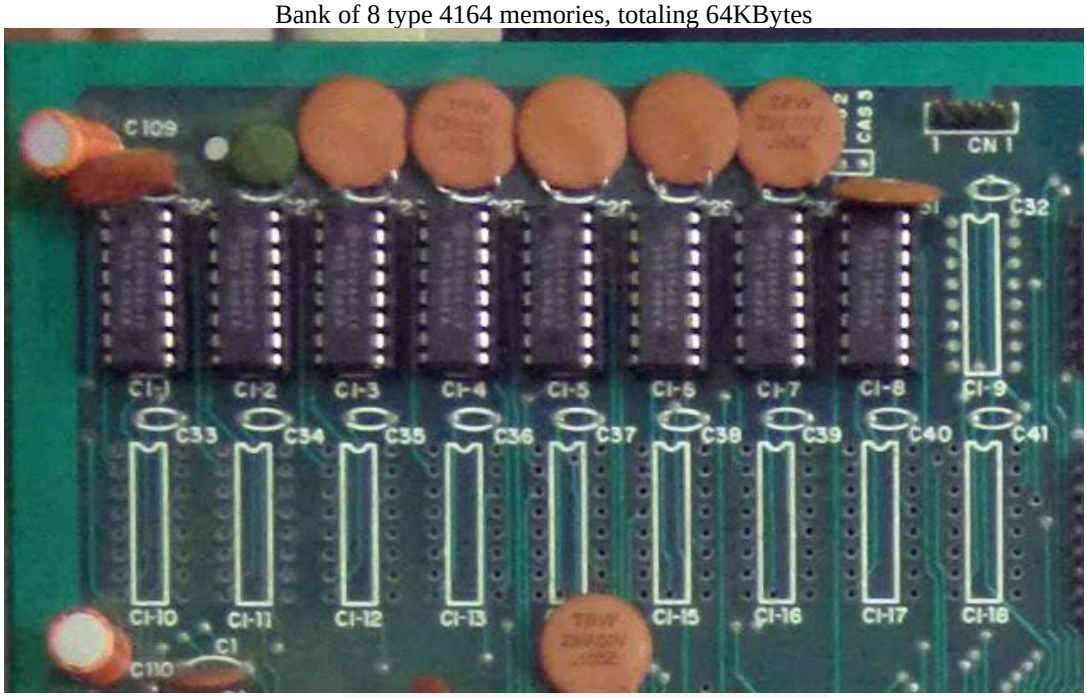
(Source:Wikipedia)

3.2 SISTEMA 600 (SYSTEM 600)

In 1983 Prologica released another clone of the Internet Superbrain, the System 600 that was also a clone of the Intertec Superbrain, but in a "simplified" version.

The "simplification" is that in the Brazilian version of System 600 (the 700 is different), the 32 memory 4116 bank was replaced by an 8 memory 4164 bank, making 64KBytes. (Souza,2017)

Bank of 8 type 4164 memories, totaling 64KBytes



(Source: O pior do meu mau humor – Tabajara Labs)

Sistema 600 has not had the same success as its predecessor, Sistema 700.

3.3 CP 200 AND CP200S

In 1982 the company's most famous family of computers started, the CP line, which stood for Personal Computer, in the same way that PC stands for Personal Computer.

The CP-200, was a clone of the British Sinclair ZX 81, a computer that was very successful because it was good and cheap, a perfect combination for the introduction and popularization of computers for the general public.

The keyboard was of the simplified mechanical type with small rectangular keys, similar to those on calculators. The total of 43 keys included - two red keys - that, when pressed simultaneously, triggered a RESET on the machine.

As with the ZX-81, each key commanded up to five functions, depending on whether the SHIFT was pressed or the data entry situation created by the basic software.

The keyboard as a whole gave access to about 160 different functions. The commands and functions in BASIC did not have to be typed out in full: each one is assigned to a key that, when pressed in the presence of the cursor marked [K] on the screen, inserts a complete keyword in BASIC. (COOPERMITI)

The CP 200 used a Zilog Z-80A processor running at 3.25 MHz, had 8 Kb ROM and 16 Kb RAM, a tape recorder output for reading and writing data and programs and an RF output for TV connection, it also had a 50-pin expansion port and a joystick socket. (HURLEY, 1984)

Prologica achieved something simple, but rare among copiers: They improved the ZX81.

The CP-200 came with a calculator keyboard that was hideous, but thousands of times better than the ZX81's membrane keyboard. The CP-200 also came with 16KB of RAM, 8KB of ROM with floating point BASIC and, well, it was nicer and more robust than the ZX81. (CARDOSO, 2021)

There were two models of the CP 200 cabinet, one with the Prologica logo and the name of the computer in high relief and the second with the Prologica logo and the name on a metal plate glued to the cabinet in the same position.

Later, Prologica redesigned the case to make it smaller and lighter, modified the keys, added an output for a video monitor and relaunched the product as CP 200S

.

CP 200 model 2 and 200S

(Source: Author's collection)

3.4 CP 500

The CP-500 Computer was a personal computer manufactured by Prologica between 1982 and 1987. It was a clone of the American TRS-80 Model III having total compatibility both in hardware

and software. All models of the CP-500, as well as almost all Prologica's computers, have their enclosures made of polyurethane resin, designed by Luciano Deviá (1943-2014).

Its main processor was a Zilog Z-80A running from 2 MHz to 4MHz depending on the model, it had a K7 port and single or double sided floppy drive depending on the model and configuration. It was just like the TRS 80 Model 30 an all-in-one micro with keyboard, CPU, and 12 inch green phosphorus monitor. (MDUTRA)

CP 500 M80C

(Source: Youtube channel: Atlantis Informática)

It was Prologica's biggest financial success, launched in April 1982 with the model that is by far the most remembered when we talk about this company and the big leader in sales. The CP-500 was a mid-range microcomputer, that was somewhere between home and corporate use, with its polyurethane case, it had almost all components integrated, including a monitor and also a professional keyboard running from BASIC in ROM. (TECMUNDO, 2020)

Released Models

Modelo	Lançamento	Descrição
CP-500	1982	Early model, released in April 1982. Sold in configuration without drives, and with one or two full-height 5" 1/4, 178 KiB drives. There was also a graphite variation of this model just before the release of the CP-500/M80.
CP-500/M80	1985	Released in 1985, the cabinet color was changed from beige to graphite. Besides this aesthetic change, it started to offer the option to operate with OS-08, operating system clone of CP/M, being able to access up to 64 KiB of RAM and use the vast software library existing for Digital Research's OS (i.e. WordStar, dBase II, CalcStar etc). With an RS-232 port (via an adapter connected to the proprietary CP532C port), it was also able to access the incipient videotext systems of the time (Cirandão, Aruanda etc.).
CP-500/M80C	1986	Released in 1986 in white, it was 30% more compact than its predecessor (hence the "C" in the name), thanks to the use of 5" 1/4 slim height drives, now placed in a vertical position in the cabinet. This model no longer had the cassette recorder port, although there was the corresponding hole in the metal back panel and the appropriate spaces for the cassette circuit components on the main board. It remained in production until September 1988 even after the release of the CP-500/Turbo.
CP-500/Turbo	1987	Last release of the line, in 1987. Similar to the CP-500/M80C, but in graphite color and its main highlight was the 4 MHz clock.

Technical Specifications.

	CP-500	CP-500 M80	CP-500 M80C	CP-500 Turbo
Year	1982	1985	1986	1987
CPU Z-80	2 MHz	2 MHz	2 MHz	4 MHz
ROM	16 kB	16kB/2Kb[1]	16kB/2Kb[1]	16kB/2Kb[1]
RAM	48 kB	48Kb/64kB[2]	48Kb/64kB[2]	48Kb/64kB[2]
Text Mode	64x16/32x16	64x16/32x16/80x24	64x16/32x16/80x24	64x16/32x16/80x24
Grafical Model	128x48	128x48	128x48	128x48
Compatibility	TRS-80 I[3]/III	TRS-80 I[3]/III/4	TRS-80 I[3]/III/4	TRS-80 I[3]/III/4

[1] Many TRS-80 model programs also run on the CP-500, but not all.
[2] The CP-500 M80 and later models were equipped with a board that allowed them to run CP/M.
[3] CP/M makes 64kB of RAM available and restricts ROM access to a range of only 2 kB.

3.4.1 Curiosities about the CP-500

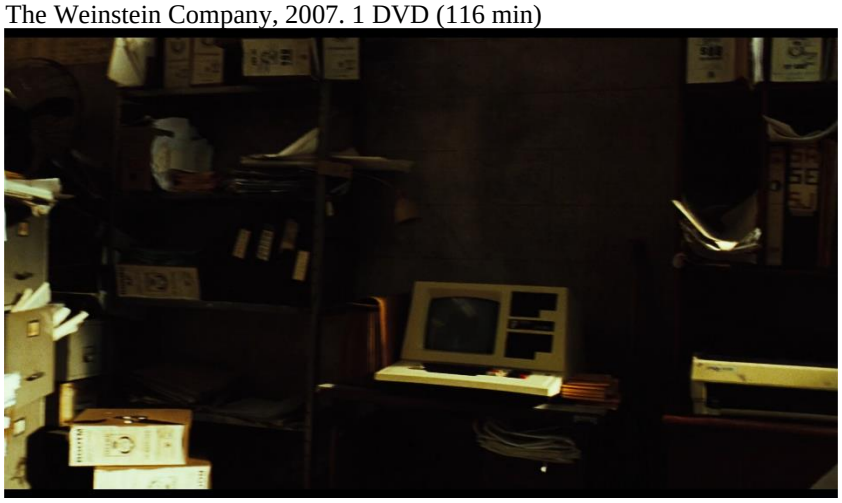
As the CP-500 was Prologica's biggest commercial success and consequently the most popular in both the corporate and home market, it remained in the popular culture of the 80's and consequently was present in other media.

3.4.1.1 Participation in the 2007 film "Tropa de Elite" (Elite Squad)

The computer had a small but important participation in the movie Elite Squad, which takes place in 1997, to demonstrate, in a somewhat exaggerated way, how obsolete the police equipment was, using a computer that had already stopped being manufactured 10 years ago, in 1987. The

computer used in the film is from Mr. Marcos Velasco's collection at his Museum of Technology.

TROPA DE ELITE; Directed by: José Padilha. Production: José Padilha and Marcos Prado. Brazil: Zazen Produções and The Weinstein Company, 2007. 1 DVD (116 min)



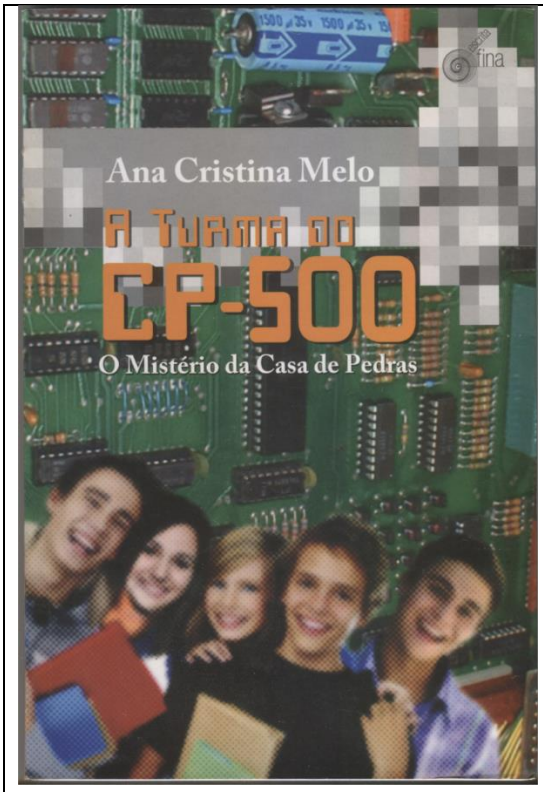
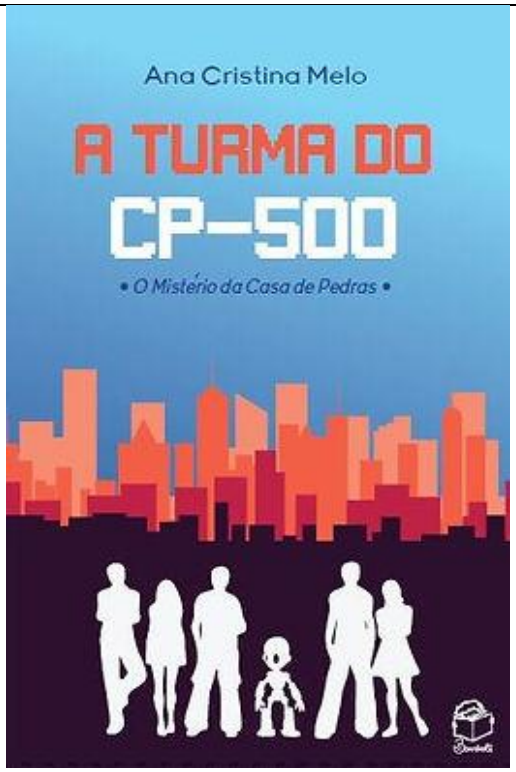
TROPA DE ELITE; Directed by: José Padilha. Production: José Padilha and Marcos Prado. Brazil: Zazen Produções and The Weinstein Company, 2007. 1 DVD (116 min)

3.4.1.2 Book "A Turma do CP 500 - O Mistério da Casa de Pedras" by Ana Cristina Melo

This is a children's book by the writer, and also systems analyst, Ana Cristina Melo.

SYNOPSIS: Fred, Lena, Gui, Cadu and Carol are friends, live in a condominium in Jacarepaguá and study at Colégio Ilíada, which is on the eve of a Student Olympics, encouraged by the Government, with a focus on the Olympics to be held in Brazil. Besides being friends, they are also teammates on the men's and women's volleyball teams. During a practice session held in a court in the condominium, the ball falls into a house that has been abandoned for some time. Gui decides to jump over the wall to get it, but takes a long time to return. The friends then decide to follow the same path, and discover something fantastic: a metallic voice coming from the middle of the empty room. The voice is Billy's, a CP-500 computer, a model from the 1980s. Billy has been completely modernized by William, who

has implanted a complex artificial intelligence system in it. Sensitized by William's disappearance and Billy's abandonment, the five friends create the CP-500 gang, whose first mission is to find Mack, William's former partner and probable hacker who invaded the Iliad School computers. Between punch cards, championships, and many suspects, they must race against time to find out the true identity of this cyber-villain.

	
1st edition 2013 by Escrita Fina publishing house	2nd edition 2020 by Bambolê publishing house

3.5 CP 300

In 1983 Prologica released a homemade version of the CP 500, the CP 300. It was, like its big brother, a clone of the TRS 80 Model III. It used the same cabinet as the CP 200 Model 2 with the redesigned keyboard. It had a Z80A processor running at 2 MHz 16kB ROM and 64 kB RAM. It had a K7 input, an RF output and a monitor output. It could be expanded with the drive interface that also served as an SM 300 enclosure and supported two floppy drives.

However, delays by the manufacturers in offering the promised peripherals and competition from machines above and below this range prevented these machines from achieving the expected success. (MICRO SISTEMAS, 1985)

CP 300 with its SM 300 enclosure/drive interface

(Source: Datassete)

CP 200 Model 2 and CP 300, the same cabinet with different keyboard.

(Source: Acervo do autor)

3.6 CP 400 COLOR

In 1984 Prologica released the CP 400 Color, a clone of the American Tandy TRS-80 Color Computer Model 2, better known as CoCo 2, which as the name suggests was a computer that used color, a novelty for the time.

It used the Motorola 6809E processor, had 16 Kb of ROM (which contained the Extended Color Basic) and RAM memory could be 16Kb in model 1 or 64 Kb in model 2. It had input for two joysticks, RF output, monitor output and RS-232-C serial port. Its design, as well as other Prologica's micros, was made by the famous Italian designer Luciano Deviá (1943-2014). (LIMA, 2021)

Like other computers of its time it had an input for K7 recorder, but it could use floppy disks if it used the CP 450 module that consisted of a cabinet containing a disk drives interface, one or two

180K single-sided floppy disk drives that was connected to the expansion port. The CP 450 was sold separately, was expensive, and therefore not very popular.

CP 450

(Source Wikipedia)

CP 400 Color Modelo 1

(Source Wikipedia)

Prologica released two models of CP 400, the 1 and the 2. The main differences between the two models were the power supply (built-in), keyboard and RAM capacity.

CP 400 Color Modelo 2

(Source Author's collection)

The CP 400 had a problem that was only discovered later, with the end of market reserve. The original game and program cartridges for the Tandy TRS-80 Color did not fit in the cartridge bay of the CP 400. They were larger, wider than the CP 400's share. Only Prologica's own manufactured cartridges fit in there, which were significantly smaller as can be seen in the pictures below:

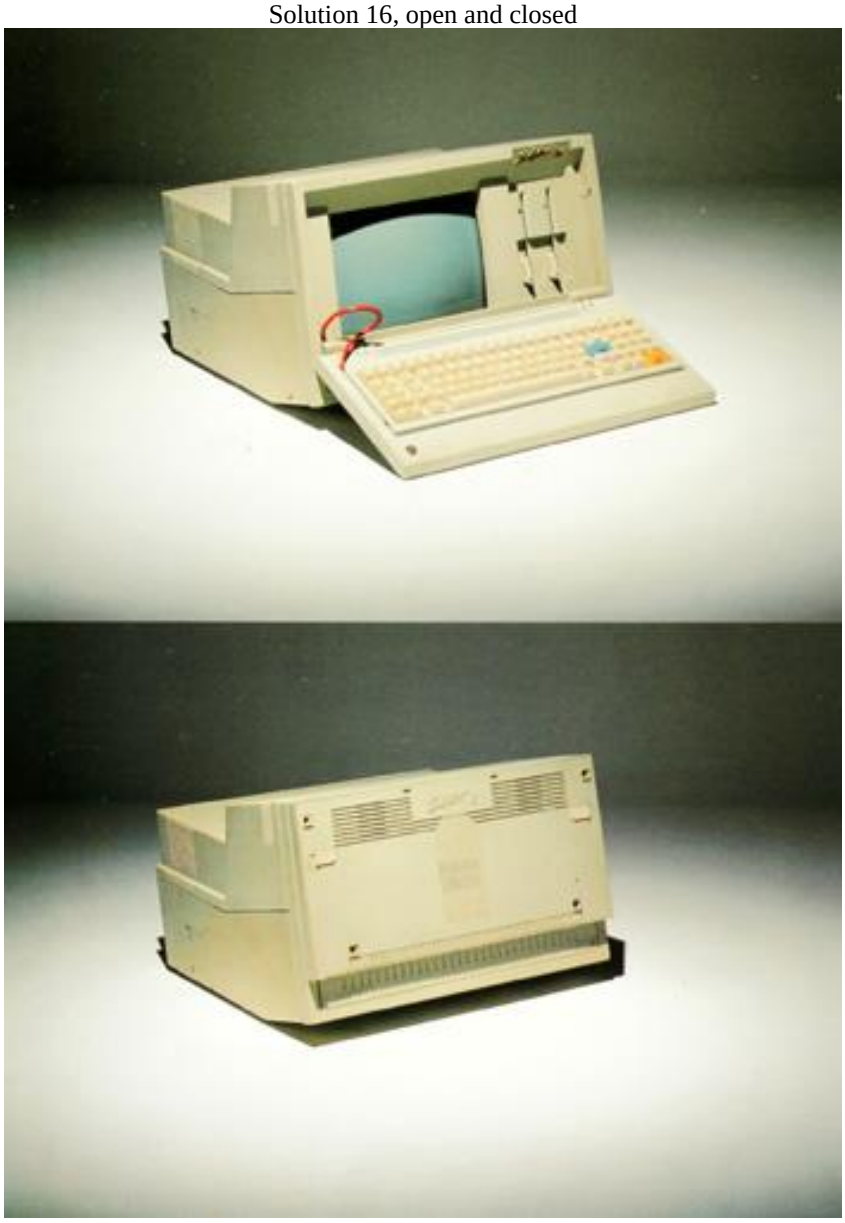
Tandy TRS-80 Color Computer Cartridgesr

Prologica cartridges

3.7 SOLUTION 16

In 1986 Prologica launched the Solution 16, the first 16-bit computer in Brazil, it was a transportable computer, that is, keyboard, CPU, monitor, and disks were all in a single piece that could be closed, with the keyboard as a cover transforming the whole set into a kind of suitcase. The beautiful and futuristic design, winner of several awards, was the work of Italian designer Luciano Deviá. The Solution 16 was widely accepted for professional use in trade and industry as well as in government circles. Another highlight was the operating system, OS16, which was basically a translated copy of MS-DOS that ended up with a lawsuit from Microsoft. Prologica later gave up on having its own operating system and made a deal with Novell to use DR-DOS on its computers. (Evoltecno, 2016)

Solution 16, open and closed



(Source: Museu da Casa Brasileira)

3.8 END OF MARKET RESERVE AND LATEST RELEASES

With the relaxation and end of the market reserve for Prologica under the Collor government, Prologica's situation became complicated. In 1991 it was still in operation, but went through a very radical restructuring with many layoffs. It even released some computers like the SP 1611, ATSP 286, ATSP 386DX, ATSP 486DX but the end was already coming. (Tecmundo, 2020)

4 EDITELE, MAGAZINE MICRO ELETRÔNICA AND ITS MICROS NE Z80 AND NE Z8000

Editele was the publishing division of Prologica. It produced the magazines Micro Eletrônica and Geração Prologica. It was in issue 56 of Nova Eletrônica of October 1981 that the NE Z80 was announced, it was the first Sinclair ZX-81 clone made in Brazil. The NE (from Nova Eletrônica) Z80 had 4kB ROM, 1 kB RAM (expandable to 16kB with external NEX 16K module), output for K7 and

RF for TV (Nova Eletrônica 56, 1981). The idea was to launch it as a kit to be assembled by the readers of the magazine, who were also technicians and electronics enthusiasts, but later it was decided to launch the microphone already assembled due to the number of doubts and assembly errors that would overload the technical support and SAC of the company. As Everaldo R. Lima, a Nova Eletrônica employee involved in the project, explains.

> “They never came out as a kit to be assembled. When the NE-Z80 came out, and it was announced in the Nova Eletrônica 56 magazine, the idea was to sell them as a KIT, but we knew that the assembly by the reader would be complicated and many would not work, so it was decided that they would be sold assembled by Prologica. It was the right decision, because they were sold by the thousands and certainly there would be congestion in the technical assistance. I worked in technical assistance for Filcres kits, when I first joined the group, and I know well how the readers did the assemblies. In the photo above I was at the service desk. After the launching of the NE-Z80 I was moved to the assembly line at Prologica, still at Av. Sta. Catarina to teach the technicians how to identify defects and fix the boards..” (Everaldo R. Lima)

> "The time is not far off when virtually every kind of human activity will have the participation of the computer. When this happens, microcomputers, both personal and professional, will play an important role in our society.
> The best way to prepare for this time is to become familiar with these machines, that is, to make use of them and understand their principle of operation. The personal microcomputer is the most appropriate way to start, especially when an inexpensive system is available in kit form. (Nova Eletrônica Magazine n° 56 p.25)

Nova Eletrônica Magazine n° 56

(Source: Datassete)

Later, the engineering group, where Mr. Everaldo R. Lima worked (see section 6) made improvements such as the SLOW function and in BASIC and launched its successor, the NE Z8000, which soon after originated the CP 200.

NE Z8000 with 16K NEX memory module

(Source: Author's collection)

5 LUCIANO DEVIÁ, PROLOGICA'S CABINET DESIGNER

Luciano Deviá, Italian designer, projected the cabinets of equipment manufactured by Prologica.

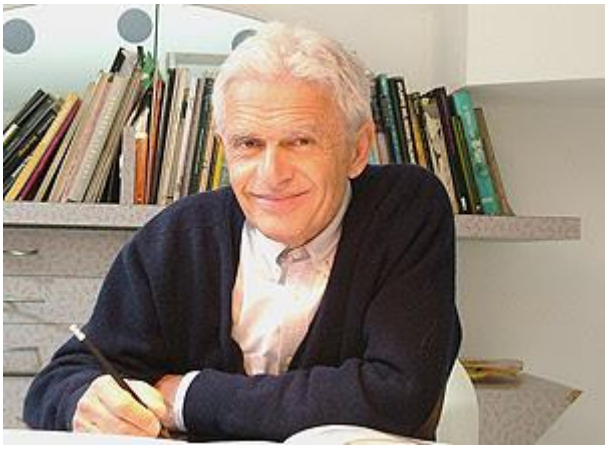
Luciano accumulated several awards in architecture and was the winner of the domestic equipment category of the 1st Design Award of the Museu da Casa Brasileira, in 1986, with the design of the Solution 16 microcomputer cabinet. (Lima 2021)

Solution 16 at Deviá's exhibition

(Source: Museu da Casa Brasileira)

Luciano did not go unnoticed when he passed through Prologica's engineering, or even in the factory hallways, with his colorful clothes and shoes in the colors of the Italian flag. Sometimes he would scavenge boards and components to sharpen his creative mind. The mechanical construction and layout of the computer boards, like the Solution 16, were designed to fit in cabinets designed by Luciano. (LIMA, 2021).

Luciano Deviá



(Source: https://iicsanpaolo.esteri.it)

Short biography with the text reproduced from the site: https://dpot.com.br/luciano-devia.html

Born in Italy, Luciano Deviá (1943-2014) graduated in architecture from the Polytechnic Institute of Turin in 1970. Established in his profession in his homeland, he decided to move to Brazil in 1978. He settled in Brasilia, where he worked for three years developing equipment projects for the Sarah Kubitscheck Hospital. In 1983, he founded his own office in São Paulo, providing consulting services in design, architecture, and interior design.

Passionate about Brazilian culture, he has transformed cangaceiros' hats into fruit squeezers and Pantanal alligators into spatulas.

Parallel to his work in the office, he was a consultant for Sebrae and Senai, through the "Via Design" project, having given countless design workshops for woodworkers and artisans in several states of the country, especially in the Amazon region. He was also a professor at the Istituto Europeo di Design (IED), in São Paulo, and was a counselor at the Museu da Casa Brasileira and director of the board of directors of A Casa Museu de Artes e Artefatos Brasileiros, both in São Paulo.

He has had several of his products awarded in Brazil and abroad. He held three personal exhibitions (1983-1993-2001), participated in numerous group shows and was the curator of two exhibitions.

6 INTERVIEW WITH EVERALDO R. LIMA, FORMER EMPLOYEE OF NOVA ELETRÔNICA

Everaldo R. Lima, in 1979 at the Nova Eletrônica laboratory and currently.

"This picture is from 1979 and I was not working on any microphone yet. I started at Nova Eletrônica repairing kits. In the laboratory I was still repairing kits when Mr. Popovich left for Microdigital and a new manager was hired, Mr. Renato Bottini.

Between one repair and another, I dedicated myself (off-line) to a project of mine, a circuit that did the same functions of a very popular toy at the time: GENIUS.

One day, Mr. Renato caught me paying attention to my project and asked me what it was. I thought it would be a scolding, when he called me to his desk. After explaining to him about the project, he invited me to be part of the technical team of the magazine, and then I started to design kits and write articles for the magazine.

In 1981 the Nova Eletrônica lab was moved to the Filcres building at Aurora Street and that's when we got the news that we would make a computer as a kit for the magazine.

Prologica sent us a disassembled Sinclair ZX-80 board, the schematics and some components in a box. Our mission was to make it into a kit for the magazine, to be sold at Filcres.

A computer that size, that could be connected to a TV and still have a BASIC (high level) language interpreter was news to all of us and we started working on the project, it was my first contact with the BASIC language. It was when the NE-Z80 was released, but not as a kit, but as a Prologica product..

The person who decided to launch the NE-Z80 as a product was Joseph Blumenfeld, one of the partners in the group. Some time later, during a conversation on the NE-Z80 production line, he told me that the project had ended up in the magazine's laboratory because no one else in the group's management believed in its success. He confessed that he was afraid that the product would fail, but in the end, it was a great success..

During the manufacturing process of the NE-Z80 I worked many hours on the production line at Prologica, even though I was not a Prologica employee, helping and teaching the technicians to fix the boards that came off the line not working.

When we launched the NE Z-80, shortly afterwards the Scientific BASIC was launched by Sinclair. One fine day, a NEZ-80 owner, living in Brasília, called the Nova Eletrônica magazine's Laboratory asking for help. He brought from abroad a Sinclair's kit which transformed the common BASIC into Scientific BASIC. This kit was composed of a ROM and a keyboard membrane that implemented the new mathematical functions.

He couldn't get it to work on the NE-Z80. I "fished" right away why it wouldn't work. It turned out that the NEZ80 used EPROM and the CS (Chip Select) sign on the EPROM was reversed from the original ROM.

We didn't have, yet, this kit to implement in the NE-Z80, the "Diplomatic Suitcase" took long to come from abroad, and I asked the guy in Brasilia, without much hope, to send the KIT that we would analyze the problem for him. And he did, and sent it.

Well, then we copied the ROM and keyboard to our designer. We, from the New Electronics Lab, decided (in off) that we would reward the guy from Brasília, keeping the original ROM and sending him an EPROM with the new recorded software to put in his NEZ-80 and another NE-Z80 with the new Scientific BASIC. This is how the NEZ-8000 was born.

When the first Sinclair ZX-81 arrived in our hands we saw that it did not "flash the screen" at all times that the processor did not pay attention to the video (SLOW function), and that it had a dedicated chip in the logic which, at the time, for us was impossible to reproduce.

Once again I, still in the New Electronics lab and unofficially, started work on the NE-Z80 to fix this. That was when I managed, with the help of a huge ROM listing and a logic analyzer, to discretely recreate the hardware part that was missing for the implementation of the SLOW function in the NE-Z8000. In the end the logic was not even identical to that of the ZX-81 and worked perfectly. And so a new product was born, the CP200.

In this same period of the CP 200 launching, I had been invited, by the Engineer Renato Bottini, former manager of the Nova Eletrônica Laboratory, to work at ITAU TECNOLOGIA (ITAUTEC), where I started in August 1982 in the quality control engineering.

At ITAUTEC I worked on the development and design of devices for testing on the production line, including the line of their first computer, the I7000, whose codename was Micrinho. The Micrinho was an original project from ITAUTEC that took almost four years to be concluded and in the end was almost obsolete. The original project used an 8085 Intel, which was already an outdated CPU, and shortly before the launch, about six months, the engineering changed the processor for a NSC800 from National, which had the same hardware architecture of the 8085, but with the ZILOG Z80 instruction set.

I couldn't achieve my goals at ITAUTEC, because there was a very rigid policy regarding positions and salaries, where it was more important which school you attended than your knowledge, performance and achievements. In 1984 I was invited to return to the Prologica group, but this time for a position in engineering.

My first activity at Prologica was reading and understanding, "from head to toe", the Tandy TRS80 technical manual. I spent a few weeks devouring the manual and answering questions about its operation with Fabio Trevizan, who was already working in engineering.

At this time the CP500 M80 was about to be released, with 80 columns video and the possibility to run CPM. Fabio Trevisan was in charge of the 80 columns video logic and his solution needed the character generator to be modified to fit the number of lines of the original CP500 video, this resulted in unconventional shaped characters. The project was ready, with the board designed, manufactured and ready to be released, but the appearance of the video did not please Prologica's marketing team and it was disapproved, with the possibility of being discarded.

When I learned that there was no time to develop a whole new circuit and make new printed circuit boards, I asked to analyze the problem together with Fabio to try some other solution. Mr. Claudio Porto, our supervisor, gave me free rein to analyze and try a solution. I started the analysis of the video circuit of the CP500.

In a few days I managed to modify, minimally, the CP500 video circuit to generate a video of 80 lines, with 40 columns, using a hybrid character generator with the CP500 and Sistema 700 character sets. This culminated with the addition of a small board, the AX23 (I made the schematics available at DATASSETE) with about three or four components that, coupled with the original board and the video developed by Fabio, made the CPM video look identical to the Sistema 700. The marketing approved and the CP500 M80 was released.

By now the custom chips that would be part of the CP500 M80 C (compact) were being developed and there was a new problem.

We developed the circuitry of the chips and the project was sent to San Jose, California - USA, where a chip manufacturer would produce them. In this process, before the fabrication of the first prototype, we were returned a listing with a logic map where we reproduced all the tests with the new chip with logic states of inputs and outputs with a resolution of 5ns (five nano seconds), this generated a huge listing of hundreds of sheets of 132 column form that needed to be checked, line by line. There were countless weeks of analysis to approve the chip, and due to the new circuit change, everything would have to be redone and the work, already done, lost. It was then that I had the idea, besides redoing the original circuit, to also generate a combination of input signals on the chip, which would never happen in the final application, this generated a condition to generate the test vectors that did not alter the original circuit already tested, requiring only a few more sheets of vectors to be analyzed. In the end came the first prototypes of the chips, with a huge apprehension of the team and the "C" in hand, the chips worked perfectly.

I also worked on the development of the 4.77MHz turbo CP500, a difficult task given the characteristics of the digital logic circuits available at the time.

Worked on the development of NE-Z80, NE-Z800, CP500, Solution 16, CP 400, SP16 286, 386 and EGA video card.

Besides the design and development work, I often had to go to the group's factory, CP Computadores, to develop artifacts for testing on the production line and help train the technicians who worked on the line. Eventually, I visited large customers where there was some problem that the technical assistance could not solve..

Prologica's products had an excellent acceptance by the public, were sold in department stores such as Mappin and Mesbla and specialized computer stores, and Prologica had 60% of the market. Prologica's products reached all segments, from beginners to the most demanding professionals. The CP500, for example, was a great success and reached all these segments, being the platform adopted for EMBRATEL's CIRANDA project, with thousands of computers produced. The so-called professional systems, such as System 700, SP 16, and Solution 16, were widely accepted for professional use in commerce and industry, as well as in governmental environments..

Solution 16 was a success due to its design created by architect Luciano Devia and the possibility of being transportable. It became the professional, portable computer. Its design won a few awards.

Not always a board that worked in Europe or USA worked in the Brazilian climate. Some international projects, by logic, shouldn't even work and worked at the limit of the specifications of the components available at the time. Today we talk about computers with Gigahertz clocks, when one talks about the difficulty of changing the CP500 clock from 2 MHz to 4 MHz, the kids today don't believe it..

Even with computers in their infancy and no standard platform in the market, before the IBM PC, no national industry could afford to develop a national microcomputer starting from scratch, there was no time to start from scratch and invent the wheel. An example that was almost a disaster was the I7000, the little Mic from ITAUTEC. They decided to do it all from scratch and almost got into trouble because they lost almost four years of development and in the end, in my point of view, it was a failure and practically only the ITAU bank used it, so much so that right after the launch Itautec came with a clone of the IBM PC, as a matter of fact, the IBM PC was conceived as a reproducible platform, hence its success with the unification of the platform and the possibility of developing software that would serve all users, regardless of the brand of their computer.

I strongly disagree with those who say that back then there were only copies, there was a lot of development work too, usually those who speak "badly" did not live this reality.

In this era of market reserve, great computer experts were forged. There was no internet, the knowledge came from paper literature, there was a waiting list to get a data sheet from Prologica's library, the transport of development material was via mail or even in suitcases subject to customs screening. Those who didn't live it, don't know.

The market reserve, practically, left no alternative for the national market and for the manufacturers, other than projects based on the international market projects, which was unattainable. Even though we had to reverse engineer the foreign products, there was a lot of national development work.

Imagine if with the market reserve, industries had to take four or five years to develop something? Who would lose out?

The loser was the market itself and the end user. The law was imposed and nothing could be done about it.

A great part of this question has already been answered in the previous one, and I ask another question: What has IT developed in Brazil with the fall of the reserve?

7 PAMPHLETS AND PROPAGANDA

(Source: Micro Sistemas Magazine)

(Source: Micro Sistemas Magazine)

(Source: Micro Sistemas Magazine)

8 CONCLUSION

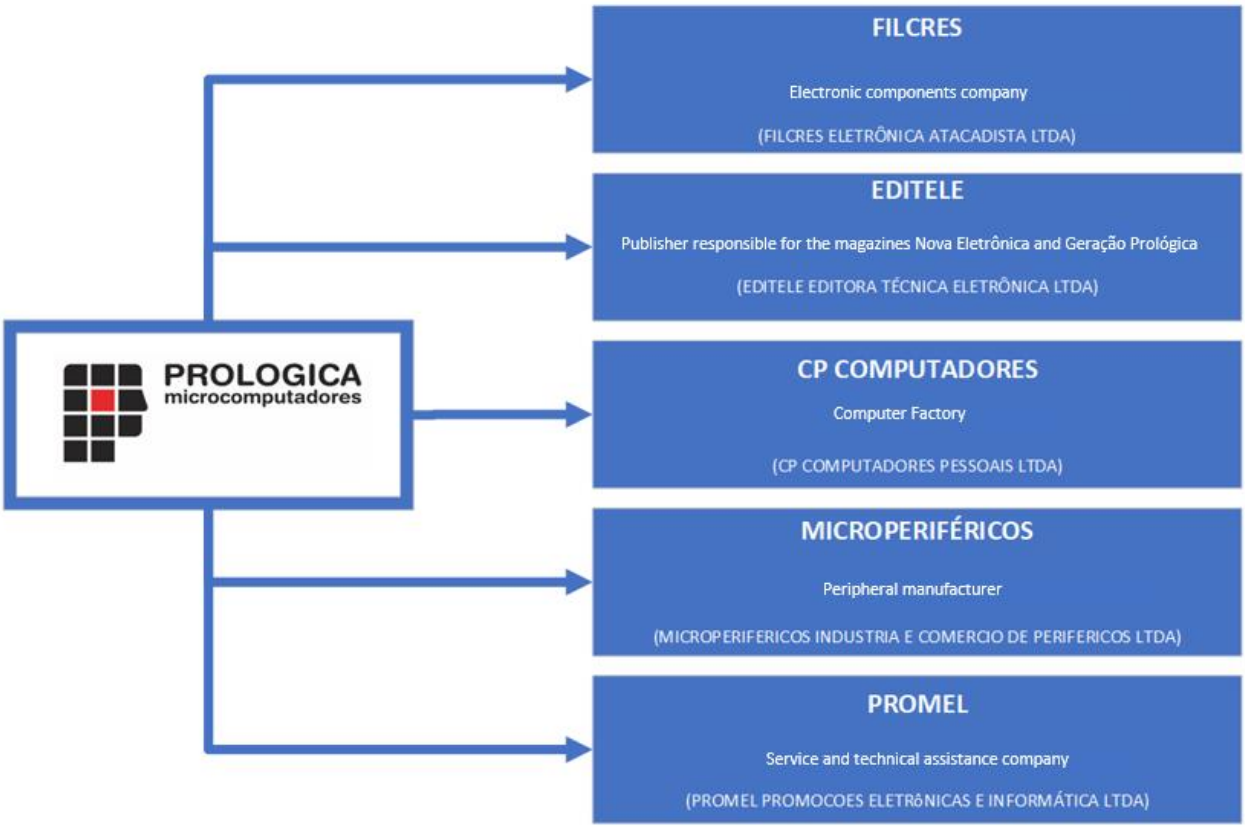
The conclusion is that Prologica, as well as its competitors such as Elebra, Microdigital, Labo, Sisco, SID, Microtec, EPCOM had their peak during the market reserve in the 80s, and didn't last long after the end of the reserve in 1991 under the Collor government.

> "In short, the histories and analyses of the market reserve, which are many, made by Brazilian and foreign researchers, recognize that phase of success. But all let glimpse the explanation of its exhaustion and consequent abandonment in 1990 as a predictable result of the combination of the offer to the market of technically outdated products at high prices with the North American pressure for Brazil to open the computer market." (MARQUES,2002,p 660)

Another problem of the PNI and the market reserve was the little attention given to software development, basically all the attention was given to hardware, including the investment in schools in programming courses that were limited to higher education such as the P15 and the Data Processing Technology course, both embryonic computer science courses created at PUC/RJ.

> "With little attention to software issues and the emergence of the novelty of microcomputers, it intended to sanctify, in the form of law, the experience of market reserve for the manufacture of minicomputers that had been practiced since 1976, serving as legal support and, therefore, as a guarantee of its durability. Paradoxically, it served as an epitaph." (Cukierman Et al. 2012)

9 PROLOGICA STRUCTURE



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