v. 3, n. 19, 2023

Journal of
Engineering
Research

PROLOGICA AND THE NATIONAL INFORMATICS POLICY

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Abstract: The purpose of this article is to talk about Prologica Computers, one of the largest microcomputers and peripheral manufacturing companies in the 1980s, which had its heyday during the Brazilian Market Reserve (Federal Law No., its reverse engineering and its entire structure of several complementary companies.
Keywords: *Prologica. National Informatics Program,* Federal Law Number: 7.232/84. R&D. Reverse engineering.

THE PNI AND THE MARKET RESERVE

On October 29, 1984, the National Congress approved Law No. 7,232, known as the National Informatics Policy (PNI). With an expected validity of 8 years, the law aimed to stimulate the development of the information technology industry in Brazil through the creation of a market reserve for national 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.

Supporters of the measure cited historical examples of successful protectionism, such as Japan and the United States. To implement the Information Technology Law, the government created the SEI (Special Information Technology Secretariat), controlled by colonels linked 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 sell microcomputers in the country at that time was Hewlett-Packard, with its HP85B model. The only restriction placed by the Government was that the machine could only be negotiated for technical-scientific applications, but not for commercial purposes (TIGRE,1988)

However, the Informatics Law was supported by sector entities, such as ABICOMP (association of national computer manufacturers), Sociedade Brasileira de Computação (representative of university professors of informatics) and APPD (unofficial union association of data processing technicians). data). Thanks to the work of these entities, many sectors of civil society warmly welcomed the Market Reserve. (DANTAS, 1988)

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 an action 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 of the republic at the time, Sepúlveda Pertence.

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

Initially, it would be valid for 8 years from the date of enactment (therefore, it must be valid until October 1992) and after that period, national companies would theoretically be on an equal footing with foreign ones. However, its end was brought forward by a year and, in October 1991, then President Fernando Collor sanctioned Federal Law No. final point in the Market Reserve.

"The adoption of an industrial policy for the manufacture of computers 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 information technology sector, in addition to several ills that appeared in other sectors, such as, for example, the technological backwardness of the cars manufactured here. Even today we hear references to the market reserve as a kind of stupid crime.1 A more detailed follow-up of events shows, however, that, a few years before his conviction, the market reserve also appeared as a worthy and surprising success. It must be noted that 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 and technology. Teams of Brazilian engineers and technicians had absorbed the technology of products originally licensed 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 so many others, benefited during the 1980s from the Market Reserve Law, which prevented the importation of foreign computers if there were similar ones in Brazil. The lack of competition, however, was considered unhealthy and a certain backwardness in the Brazilian computer parks was the result of this political controversy, which ended up being relaxed from the 1990s onwards. most Brazilian computer companies were not competitive and ended up closing their doors or being sold. (Wazlawick, 2017)

BIRTH AND FOUNDATION

Prologica Computers was founded in 1976 by Leonardo Bellonzi, Italian naturalized Brazilian, owner of an electronic components store (FILCRES) and Joseph Blumenfeld who was French and stayed as technical director of the new company, later joined by Stellamare Fassy Bellonzi, mother Leonardo, who started as financial director and engineer Geraldo Cohen, as well as Carlos Roberto Gauch, who was responsible for Marketing.

The company initially marketed machines for use in accounting such as the MCA-100 and Alpha Disk. The company later specialized in producing products similar to the American Sinclair ZX-81, Tandy TRS-80 and Tandy TRS-80 Color Computer II line computers. These PCs started with the initials CP (Personal Computer) followed by a number. Its biggest success in the market was the micro CP 500, compatible with the Radio Shack Tandy TRS-80 Model III.

PROLOGICA
microcomputadores

Prológica Logo (Source: Datassete)

Prologica became Christian Fittipaldi's master sponsor at the time of Karting, below Christian Fittipaldi and Rubinho Barrichelo.

Christian Fittipaldi and Rubinho Barrichelo. (Source Motorsport.com)

Prologica was also a sponsor of SuperKart championships in Brazil. Superkarts are high-speed kart competitions.

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

1983 SuperKart race (Source MV Informática - https://www.velasco.com.br)

PRODUCTS

SYSTEM 700

Prologica's first major launch into the consumer market was in 1981 with the Sistema 700.

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

Prologica System 700 (Source: Wikipedia)

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

Its keyboard is complete, of the electromechanical type, incorporated into the cabinet of the central unit.

The video monitor is a monochrome, phosphor green, 12-inch video monitor built into the central unit cabinet. Represents text in the format of 24 lines by 80 columns, in uppercase and lowercase 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 encompasses the keyboard circuit, 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, executing all functions related to processing and video, while the second takes care of the routines controlling disk I/O operations. (FIPP/ FACOP. 2016)

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

and the initial load (bootstrap).

The central unit includes all 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 and 19,200 bauds, and synchronous, with speeds of 1,200, 2,400, 4,800 and 19,200 bauds. (FIPP/FACOP. 2016)

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

It achieved relative commercial success in financial, database and engineering applications. Due to the 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 such as word processors (WordStar), spreadsheets (CalcStar) and databases (DataStar and dBase II) were also supported. Its applications could be programmed in BASIC, Cobol-80 and Fortran.

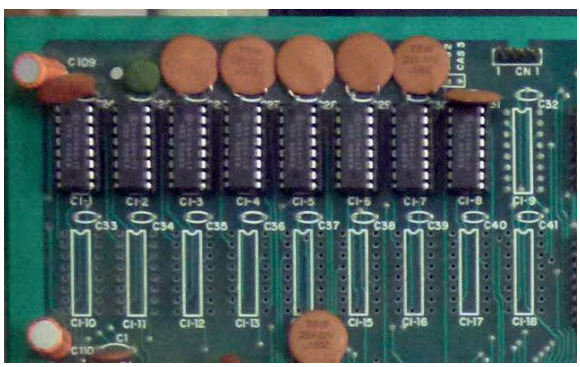
It was a clone of the American computer Intertec Superbrain released in 1979 in the USA.

Intertec Superbrain (Source: Wikipedia)

SYSTEM 600

In 1983 Prologica released another clone of the Internet Superbrain, the Sistema 600 which was also a clone of the Intertec Superbrain, but in a "Simplified" version.

The "simplification" is that in the Brazilian version of the 600 system (the 700 is different), the bank of 32 memories 4116 was replaced by a bank of 8 memories 4164, totaling 64KBytes. (Souza, 2017)



Bankof 8 memories type 4164, totaling 64KBytes (Source: The worst of my bad mood – Tabajara Labs)

The System 600 was not as successful as its predecessor, the System 700.

CP 200 AND CP200S

In 1982, the company's most famous family of computers began, the CP line, which meant Personal Computer, in the same way that PC means Personal Computer.

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

The keyboard was a simplified mechanical type with small rectangular keys, similar to those on calculators. The total of 43 keys included – two red – which, when pressed simultaneously, cause a RESET in the machine (reboot).

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

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

The CP 200 used a Zilog Z-80A processor running at3.25 MHz, it had 8 Kb of ROM and 16 Kb of RAM, cassette recorder output for reading and recording data and programs and an RF output for connecting to the TV, it also had a 50-pin expansion port and a joystick socket. (HURLEY, 1984)

Prologica achieved something even simpler, 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 membrane keyboard on the ZX81. The CP-200 also came with 16KB of RAM, 8KB of ROM with floating-point BASIC, and, well, it was prettier and more robust than the ZX81. (CARDOSO, 2021)

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

Later, Prologica redesigned the case making it smaller and lighter, modified the keys, added an output for a video monitor, and re-released the product as the CP 200S.

CP 200 model 2 and 200S (Source: Author's collection)

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 full compatibility in both hardware and software. All CP-500 models, as well as practically all Prologica computers, have their cabinets made of polyurethane resin, designed by Luciano Deviá (1943-2014).

Its main processor was a Zilog Z-80A running from 2 MHz to 4 MHz depending on the model, it had a K7 input and a single or double sided floppy disk drive depending on the model and configuration. It was like the TRS 80 Model 30 an all-in-one PC with

keyboard, CPU, and 12-inch green phosphor monitor. (MDUTRA)

CP 500 M80C (Source: Atlantis Informática Youtube Channel)

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

Released Models

Model	Launch	Description
CP-500	1982	Initial model, released April 1982. Sold in driverless configuration, and with one or two 5" 1/4 full height, 178 KiB drives. There was also a graphite variation of this model shortly before the release of the CP-500/M80.
CP-500/M80	1985	Launched in 1985, the cabinet color was definitely changed from beige to graphite. In addition to this aesthetic change, it now offers the option of operating with SO-08, the CP/M clone operating system, being able to access up to 64 KiB of RAM and use the vast existing software library for the Digital Research OS (i.e., WordStar, dBase II, CalcStar etc). With an RS-232 port (through an adapter connected to the CP532C proprietary port), it was also capable of accessing the incipient videotext systems of the time (Cirandão, Aruanda, etc.).
CP-500/M80C	1986	Launched 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 vertically in the cabinet. This model no longer had the port for the cassette recorder, although there was the corresponding hole in the rear metal panel and the appropriate spaces for the cassette circuit components on the main board. It remained in production until September 1988, even after the launch of the CP-500/Turbo.
CP-500/Turbo	1987	Last launch of the line, in 1987. Similar to CP-500/M80C, but in graphite color and its main highlight was the clock, 4 MHz.

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	16kB	16kB/2Kb1	16kB/2Kb1	16kB/2Kb1
RAM	48kB	48Kb/64kB2	48Kb/64kB2	48Kb/64kB2
Text Mode	64x16/32x16	64x16/32x16/80x24	64x16/32x16/80x24	64x16/32x16/80x24
Graphic Mode	128x48	128x48	128x48	128x48
Compatibility	TRS-80 I3/III	TRS-80 I3/III/4	TRS-80 I3/III/4	TRS-80 I3/III/4

[1]Many programs from the model TRS-80 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 just 2kB.

FACTS ABOUT THE CP-500

As the CP-500 was Prologica's biggest commercial success and consequently the most popular both in business and the home market it stuck in the popular culture of the 80's and consequently found its way into other media.

Participation in the film Tropa de Elite, 2007.

The computer had a small but important participation in the film Elite Squad, which was shown in 1997, to demonstrate, in a somewhat exaggerated way, how obsolete the police equipment was, which used a computer that had already ceased to be used. manufactured 10 years ago, in 1987. The computer used in the film is from the Mr. Marcos Velasco from his Museum of Technology.

ELITE SQUAD; Directed by: José Padilha. Production: José Padilha and Marcos Prado. Brazil: Zazen Productions and The Weinstein Company, 2007. 1 DVD (116 mi)

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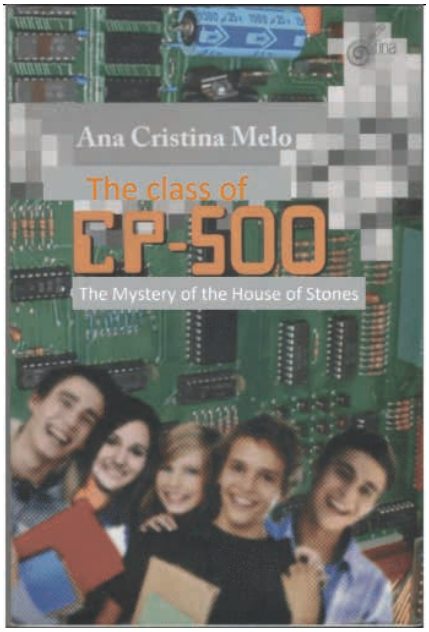
Book "A Turma do CP 500 – O Mistério da Casa de Pedras" by Ana Cristina Melo

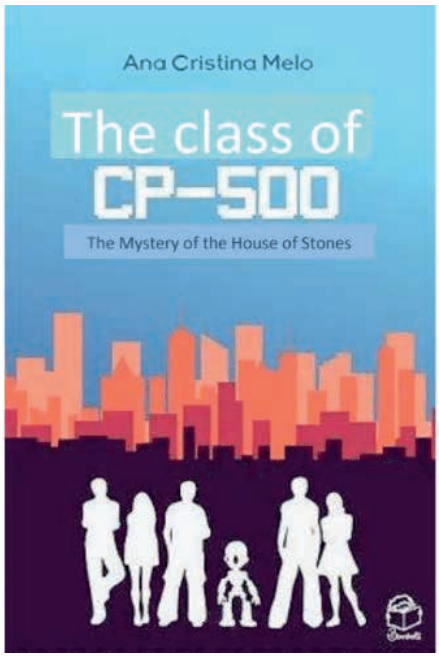
This is a children's book by the writer, and also systems analyst, Ana Cristina Melo.

Synopsis:

Fred, Lena, Gui, Cadu and Carol are friends, they 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. In addition to being friends, they are also teammates on the men's and women's volleyball teams. During a training session held on a court in the condominium, the ball lands on a house that has been abandoned for some time. Gui decides to jump over the wall to get her, but takes a while to get back. The friends then decide to take the same path, and end up discovering something fantastic: a metallic voice coming from the middle of the empty room. The voice is Billy, a CP-500 computer, model from the 80's. Billy was completely modernized by William, who implanted him with a complex artificial intelligence system. Sensitized by William's disappearance and Billy's abandonment, the five friends create the CP-500 Gang, whose first mission will be to find Mack, William's former partner and probable hacker who invaded the computers at Colégio Ilíada. Between punched cards, championships and many suspects, they have to race against time to discover the true identity of this cybervillain.



1st edition of 2013 by Escrita Fina publishing house



2nd edition of 2020 by Bambolê publisher

CP 300

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

However, the manufacturers' delay in offering the promised peripherals and competition from machines located above and below this range prevented these devices 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, same cabinet with different keyboard. (Source: Author's collection)

CP 400 COLOR

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

It used the Motorola 6809E processor, had 16 Kb of ROM (which contained Extended Color Basic) and the RAM memory could be 16 Kb 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, like other Prologica PCs, was made by the famous Italian designer Luciano Deviá (1943-2014). (LIMA, 2021)

Like other computers of its time, it had an input for a K7 recorder, but it could use floppy disks if the CP 450 module was used, which consisted of a cabinet containing a disk drive interface, one or two floppy disk units, single-sided 180K drives that was plugged

into the expansion port. The CP 450 was sold separately, was expensive, and therefore not very popular.

CP 450 (Wikipedia source)

CP 400 Color Model 1 (Wikipedia source)

Prologica released two CP 400 models, 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 Model 2 (Source Author's collection)

CP 400 had a problem that was only discovered later, with the end of the market reserve. The original game and program cartridges for the Tandy TRS-80 Color did not fit in the CP 400 cartridge compartment. They were larger, wider than the CP 400 allotment. as seen in the pictures below:

Tandy TRS-80 Color Computer Cartridges

Prologica Cartridges

SOLUTION 16

In 1986 Prologica launches Solution 16, the first 16-bit 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 lid transforming the whole set in a kind of briefcase. The beautiful, futuristic, award-winning design was the work of Italian designer Luciano Deviá. Solution 16 has been widely accepted for professional use in commerce and industry as well as in government environments. Another highlight was the operating system, OS16, which was basically a translated copy of MS-DOS that ended up being sued by Microsoft. Later Prologica gave up on having its own operating

system and made an agreement with Novell to use DR-DOS on their computers. (Evoltecno, 2016)

Solution 16, open and closed (Source: Museu da Casa Brasileira)

END OF BOOKING AND LATEST RELEASES.

With the relaxation and end of Prologica's market reserve in the Collor government, Prologica's situation became complicated. In 1991 it was still in operation, but underwent a rather radical restructuring with many layoffs. It launched some micros like the SP 1611, ATSP 286, ATSP 386DX, ATSP 486DX but the end was coming. (Techmundo, 2020)

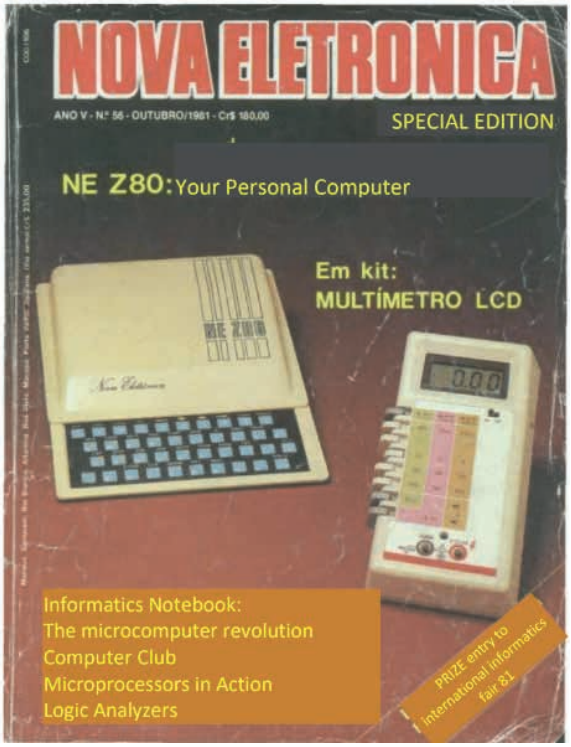
EDITELE, MICRO ELETRÔNICA MAGAZINE AND ITS NE Z80 AND NE Z8000 MICROS

Editele was the publishing division of Prologica. It produced the magazines Micro Eletrônica a and Geração Prologica. It was in issue 56 of Nova Eletrônica of October 1981 that the NE Z80 was announced, it was the first clone of the Sinclair ZX-81 made in Brazil. The NE (from Nova Eletrônica) Z80 had 4kB of ROM, 1 kB of RAM (expandable up to 16kB with an external module NEX 16K), output for K7 and RF for TV. (New Electronics 56, 1981). The idea was to launch it in kit form to be assembled by the magazine's readers who were also technicians and electronics enthusiasts, but later it was decided to launch the micro already assembled due to the number of doubts and assembly errors that would overload the technical support and SAC of the company. As explained by Everaldo R. Lima, an employee at Nova Eletrônica and involved in the project.

> "They never came out as Kit to Ride. When the NE-Z80 came out, and it was announced in the Nova Eletrônica 56 magazine, the idea was to sell them in KIT, but we knew that the assembly by the reader would be complicated and many would not work, so it was decided that it would be sold assembled by Prologica. Right decision, as they were sold by the thousands and there would certainly be congestion in technical assistance. I worked in the technical assistance of kits at Filcres, when I started in the group and I know very well how the readers made the assemblies. In the photo above, I was on the technical assistance bench. After the launch of the NE-Z80, I was moved to the assembly line at Prologica, still on Av. Sta. Catarina to teach the technicians how to identify defects and fix the plates." (Everaldo R. Lima)

> "The time is not far off when virtually every type of human activity will have the computer participation. When this occurs. 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 right now, that is, by using them and

understanding their operating principle. The personal microcomputer is the best way to get started. especially when you have an affordable system, in kit form." (New Electronic Magazine No. 56 p.25)



New Electronic Magazine No. 56 (Source: Datassete)

Later, the engineering group, where Mr. Everaldo R. Lima (see section 6) made improvements such as the SLOW function and BASIC and launched its successor, the NE Z8000, which shortly afterwards gave rise to the CP 200.

NE Z8000 with NEX 16K memory module (Source: Author's collection)

LUCIANO DEVIÁ, THE DESIGNER OF THE PROLOGICA CABINETS

Luciano Deviá, an Italian designer, designed the cabinets for the equipment manufactured by Prologica.

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

Solution 16 on display at Deviá (source: Museu da Casa Brasileira)

Luciano did not go unnoticed when he walked around Prologica's engineering, or even in the factory corridors, with his colorful clothes and shoes in the colors of the Italian flag. Sometimes he scavenged for boards and

components to sharpen his creative mind. The mechanical construction and board layout of computers such as the Solution 16 were designed to fit into Luciano's designed cabinets. (LIMA, 2021).

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

Short biography with the text reproduced from the website: 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 the profession in his homeland, he decided to move to Brazil in 1978. He settled in Brasília, 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 turned cangaceiros' hats into fruit juicers and alligators from the Pantanal into spatulas.

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

It had several of its products awarded in Brazil and abroad. He held three personal exhibitions (1983-1993-2001), participated in numerous group shows and curated two exhibitions.

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

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

"This photo is from 1979 and it still didn't work on any PC. I started at Nova Eletrônica repairing kits. In the laboratory I was still repairing kits when Eng. Popovich left for Microdigital and a new Manager was hired, Eng. Renato Bottini.

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

In one day, Eng. Renato caught me paying attention to my project and asked me what it was all about. I thought it would be a scolding when he called me to his table. After explaining the project to him, he invited me to join the magazine's technical team, and so I started designing kits and writing articles for the magazine.

In 1981 the Nova Eletrônica laboratory was transferred to the Filcres building on Rua Aurora and that was 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 schematic and some components in a box. Our mission was to make it a magazine kit, to be sold at the Filcres store.

A computer of that size, which could be connected to a TV and even with a BASIC language interpreter (high level) was new to all of us and we started working on the project, it was my first contact with the BASIC language. That's when the NE-Z80 was launched, but not as a Kit but as a Prologica product.

Who decided to launch the NE-Z80 as a product was Joseph Blumenfeld, one of the partners of the group. Some time later, in a conversation on the NE-Z80 production line, he told me that the project would have ended up in the Revista laboratory because no one on the group's board believed in its success. He confessed that he was afraid of the failure of the product, which in the end was a great success.

In the NE-Z80 manufacturing process, I worked many hours on Prologica's production line, even though I wasn't an employee of it, helping and teaching the technicians how to fix the boards that came out of the line without working.

When we released the NE Z-80, shortly afterward, Scientific BASIC was released by Sinclair. One fine day, an owner of the NEZ-80, residing in Brasilia, called Nova Eletrônica's Laboratory asking for help. He brought from abroad a Sinclair Kit that transformed 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 didn't work. It turns out that the NEZ80 used EPROM and the CS (Chip Select) signal from the EPROM was inverted in relation to the original ROM.

We still didn't have this kit to implement in the NE-Z80, the "Diplomatic Bag" took a long time to arrive from abroad, and without much hope I asked the guy from Brasilia to send the KIT and we would analyze the problem for him. And he trusted and sent.

Well, then it was copying the ROM and keyboard to our designer. We at Laboratório da Nova Eletrônica decided (offline) that we would reward the guy from Brasilia, we kept the original ROM and sent him an EPROM with the new recorded software, for him to put in his NEZ-80 and another NE-Z80 with the new Scientific BASIC. That's how the NEZ-8000 was born.

When the first copy of Sinclair's ZX-81 arrived in our hands, we saw that it didn't "flash the screen", at all times that the processor wasn't paying attention to the video (SLOW function), and that it had a dedicated chip in logic what, at the time, it was impossible for us to reproduce.

Once again I, still in the Nova Electronica lab and unofficially, started work on the NE-Z80 to correct this. That's when I was able, with the help of a huge ROM listing and a logic analyzer, to discreetly recreate the missing hardware part for implementing the SLOW function on the NE-Z8000. In the end, the logic wasn't even identical to that of the ZX-81 and it worked perfectly. And so a new product was born, the CP200.

During the same period of CP 200 launch, I had been invited by Engineer Renato Bottini, former manager of the New Electronics Laboratory, to work at ITAU TECNOLOGIA (ITAUTEC), where I started in August 1982 in quality control engineering.

At ITAUTEC I worked on the development and design of devices for testing on the

production line, including the line for their first computer, the I7000, whose codename was Micrinho. The Micrinho was an original ITAUTEC project that took almost four years to complete and, in the end, was almost born obsolete. The original project used an Intel 8085, which was already an outdated CPU, and shortly before the launch, I think about six months, engineering changed the processor for an NSC800 from National, which had the hardware architecture of the 8085, however, with the ZILOG Z80 instruction set.

I wasn't able to reach my goals at ITAUTEC, because there was a very strict policy regarding positions and salaries, where it was more important which school you attended than your knowledge, performance and achievements. It was when, 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 to read and understand, "from cover to cover" the technical manual for the Tandy TRS80. It took a few weeks to devour the manual and answer questions about the operation with Fabio Trevizan, who was already working in engineering.

At that time, the CP500 M80 was about to be launched, with 80-column video and the possibility of running CPM. Fabio Trevisan was in charge of the 80-column video logic and his solution required that the character generator be modified to fit the number of lines of the original CP500 video, which resulted in characters with an unconventional format. The Project was already ready, with the board designed, manufactured and ready to be released, but the appearance of the video did not please the Prologica marketing team and it was rejected, with the possibility of being discarded.

When I found out there wasn't time to develop a whole new circuit and make new printed circuit boards, I asked him to analyze the problem together with Fabio to try some other solution. Mr. Cláudio Porto, our supervisor, gave me carte blanche to analyze and try to find a solution. I started the CP500 video circuit analysis.

In a few days I managed to minimally modify the CP500's video circuit to generate an 80-line, 40-column video using a hybrid character generator with the CP500 and System 700 character sets. a small board, the AX23 (the scheme I made available on DATASSETE) with three or four components which, coupled to the original board and the video developed by Fabio, made the appearance of the video in CPM identical to that of the System 700. Marketing approved and the CP500 M80 was released.

By this time the custom chips, which would be part of the CP500 M80 C (compact) were already being developed and there was a new problem.

We developed the circuitry for the chips and the design was sent to San Jose, California - USA, where a chip manufacturer would produce them. In this process, before manufacturing the first prototype, we were returned a list with a logic map where all the tests with the new chip were reproduced with logical states of inputs and outputs with a resolution of 5ns (five nanoseconds), this generated a list huge number of hundreds of 132-column form sheets that needed to be checked line by line. There were countless weeks of analysis to approve the chip and, due to the new change in the circuit, everything would have to be redone and the work, already done, lost. That's when I got the idea of, in addition to redoing the original circuit, also generating a combination of input signals on the chip, which would never happen in the definitive application, this generated a condition to generate 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, the first prototypes of the chips arrived, with a huge apprehension from 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.

I worked on the development of NE-Z80, NE-Z800, CP500, Solution 16, CP 400, SP16 286, 386 and EGA Video Card.

In addition to design and development work, I often had to travel to the group's factory, CP Computers, to develop artifacts for testing on the production line and help train technicians working on the line. Eventually, I visited large customers where there was a problem that technical assistance did not solve.

Prologica's products were well accepted by the public, they were sold in magazines such as Mappin and Mesbla and specialized IT stores, and Prologica reached 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. As for the so-called professional systems such as the Sistema 700 and SP 16 and Solution 16, they were widely accepted for professional use both in commerce and industry as well as in government circles.

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

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

Even with information technology in its infancy and there was no platform standard on the market, before the IBM PC, no national industry could afford to develop a national micro starting from nothing, there was no time to start from nothing and invent the wheel. An example that was almost a disaster was the I7000, the Micrinho from ITAUTEC. They decided to do everything from scratch and they almost fell apart, as 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 already came with a clone of the IBM PC, in 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 served all users, regardless of the brand of their computer.

I completely disagree with those who say that at that time there were only copies, there was a lot of development work too, usually those who say "bad" didn't live this reality.

At this time, of market reserve, great beasts of information technology were forged. Learning was on the "nail" there was no internet, knowledge came from literature on paper, there was a waiting list to remove a data sheet from the Prologica library, the transport of material for development was via mail or even in bags subjected to sieving from customs. Those who have not lived, do not know.

The market reserve practically left no alternative for the national market and for the manufacturers, other than projects based on projects in the international market, which was unattainable. Even having to reverse

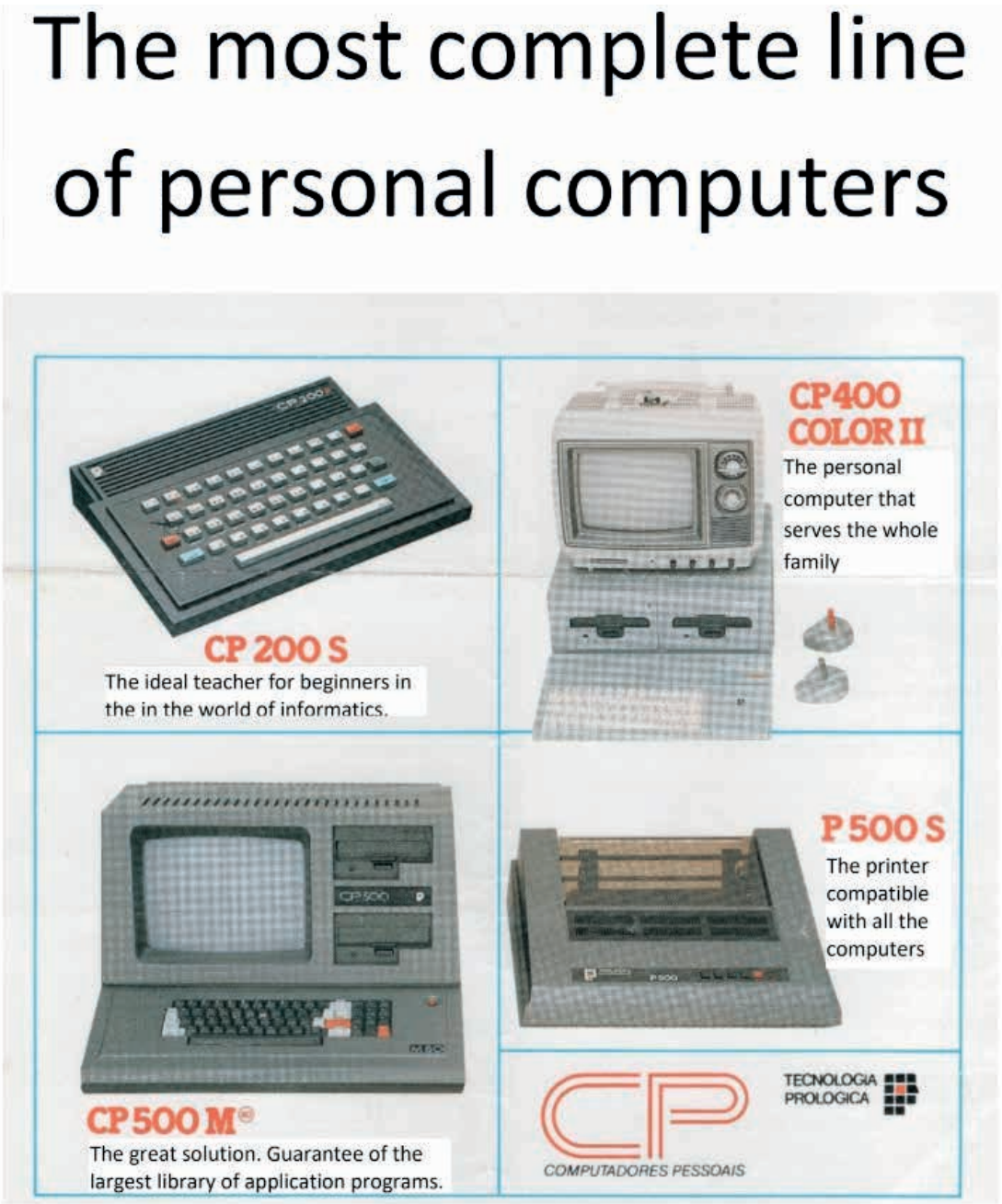
engineer products from abroad, there was a lot of domestic development work."

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

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

A large part of this question has already been answered in the previous one and I ask another question: What has developed in terms of information technology in Brazil with the fall in the reserve?

FLYERS AND ADVERTISING



(Source: Micro Sistemas Magazine)

(Source: Micro Sistemas Magazine)

(Source: Micro Sistemas Magazine)

CONCLUSION

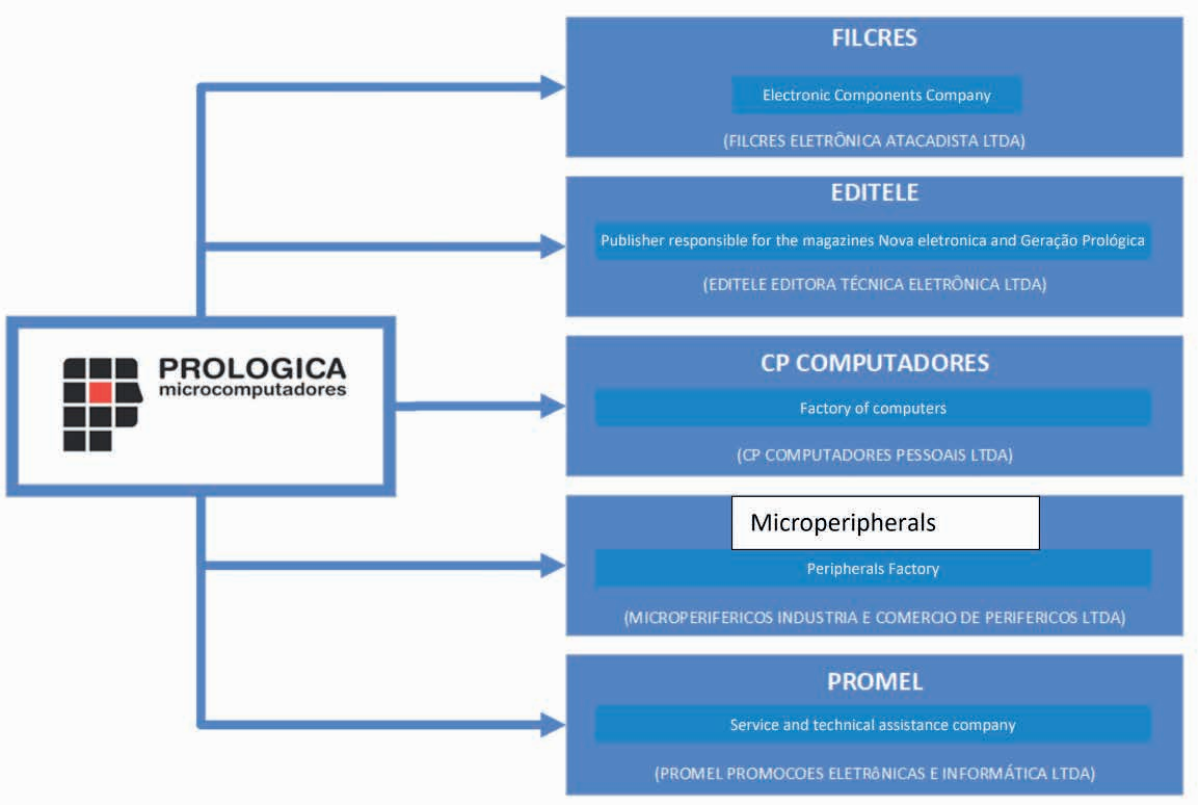
The conclusion is that Prologica, as well as its competitors like Elebra, Microdigital, Labo, Sisco, SID, Microtec, EPCOM had their peak in the market reserve, in the 80s, and did not last long after the end of the reserve in 1991 in Collor government.

> "In short, the stories and analyzes of the market reserve, of which there are many, made by Brazilian and foreign researchers, recognize that successful phase. But they all hint at the explanation of their 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 North American pressure for Brazil to open up the computer market." (MARQUES, 2002, p 660)

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

> "With little attention to software issues and the appearance of the novelty of microcomputers, it intended to enshrine, in the form of law, the experience of reserving the market 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 his epitaph." (Cukierman et al. 2012)

STRUCTURE OF PROLOGICA



THANKS

I would like to thank my friends from the Retrópolis group, Color Brasil group (discussion list, whatsapp and telegram), Mr. Everaldo R. Lima and Alexandre Souza.

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