Yugoslav home computers of the 80's

When the whole world started making home computers, former Yugoslavia had an import law that practically forbade import of such machines.

In 1984 the first Yugoslav home computer appeared (completely open source, by today's standards) and started a revolution in home computing...
Who am I...

- Passionate about old 8-, 16- and 32-bit home computers (not x86 PC!)
• One of the founders of Once Upon a Byte nonprofit organization, www.onceuponabyte.org
Night of Museums, Novi Sad, 2013
LUGoNS BarCamp 1,2
BalCCCon 2013
Novi Sad
More professional background...

- Linux user and promoter since 2006, member of Linux User Group of Novi Sad
  www.lugons.org – BalCCon, LUGoNS BarCamp
- Teaching assistant/assistant professor at Faculty of Technical Sciences, University of Novi Sad
- zzarko at lugons.org, uns.ac.rs
Yugoslavia, 1956

CER-10, 1956-1960

CER-12, 1971
World, 1971-1977

- 1971
- 1974
- 1975
- 1976
- 1977

1971

- 1975, 8080A
- 1976, 6502
- 1977, Z80
World, 1977-1984
Home computers in Yugoslavia, 1980-1984

- 50DM limit on import of any foreign goods
- Relatively poor domestic integrated circuit industry, no microprocessors
- Draconian import charges
- 1982: EL-82, Z80, 16kB RAM, 6000DM

So, how could average person (salary) in Yugoslavia obtain a home computer?
First solution...

Smuggling, of course!

It's a dishwasher part... "Spectrum Superwash"... Believe me... See, it's made of rubber, that's because of all the water...
...second...

Legally importing foreign computers, and selling them for 2,3 or more times the price outside Yugoslavia
... and finally, the third one!
A vision of one man – Voja Antonić

1983

2013
How to make an affordable computer

1. Video output
2. BASIC
3. Few parts
   Z80A
   6KiB RAM
   4KiB ROM
   64x48 pix
   32x16 chr
4. Single-sided PCB
Peripherals

EAR and MIC
Public response to Galaksija

Over 8000 kits were sold

Commercial version, 600DM
As many as the constructors...
Galaksija today

Galaksija today

### Other computers

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**DOCUMENTATION!!!**
Lola 8A

- i8085
- 980DM
- 24KiB ROM
- 16KiB RAM
- 320x200 pix, 3 channels
Galeb

6502             ~1400DM
16KiB ROM        9KiB RAM
96x48 pix,       1 channel

Galeb 101 (early)
Orao

Orao MR102

6502  ~1250DM
16KiB RAM  16KiB ROM
256x256 pix, 32x32 chr
1 channel

Orao 102 (early)

2013
Orao+

6502
64KiB RAM  32KiB ROM
640x400 pix, 80x25 chr
1 channel

6502
32KiB RAM  16KiB ROM
256x256 pix, 32x32 chr
1 channel
Orao 2007, 2008

IDE interface
SID sound
TMS9918A
video

http://www.deltasoft.com.hr/retro/index.htm
Ei Pecom 32 and 64

CPD 1802B 5V7
32/64KiB RAM 16KiB ROM
240x216 pix, 40x24 chr
2 channels
Hobby ZR-84

Z80A ~300DM
4KiB RAM 12KiB ROM
128x48 pix, 64x16 chr
Misedo 85

Re-branded Tandy Color Computer 2
Oric Nova 64

Re-branded Oric Atmos, but with 64KiB RAM
ZX Keyboards
CP/M machines

TIM 011
So, what happened to all those computers?
ZX vs C64 vs CPC vs Atari vs ...
The promise of a school computer
Old Yugoslav home computers today

- Emulators for most machines exist
- Pecom Emulator (part of MESS), Miodrag Milanović (he was working many other east-european computers emulators), http://micko-wip.blogspot.com/2008/11/pecom-64.html
- Work is ongoing on Lola 8A emulator (ROMS were extracted only a few months ago)
- A lot of individuals (including people at Once Upon a Byte) are trying to save as many about those machines as they can
- They can be seen in several computer history museums in former Yugoslavia
The End... (References)

- Računari, Svet Kompjutera, Moj Mikro and other Yugoslav magazines from the 80's
  - personal collection
  - http://retrospec.sgn.net/users/tomcat/yu/revije.php
- Wikipedia
- Caricatures by Predrag Milićević, used with his permission
- Personal experience :)