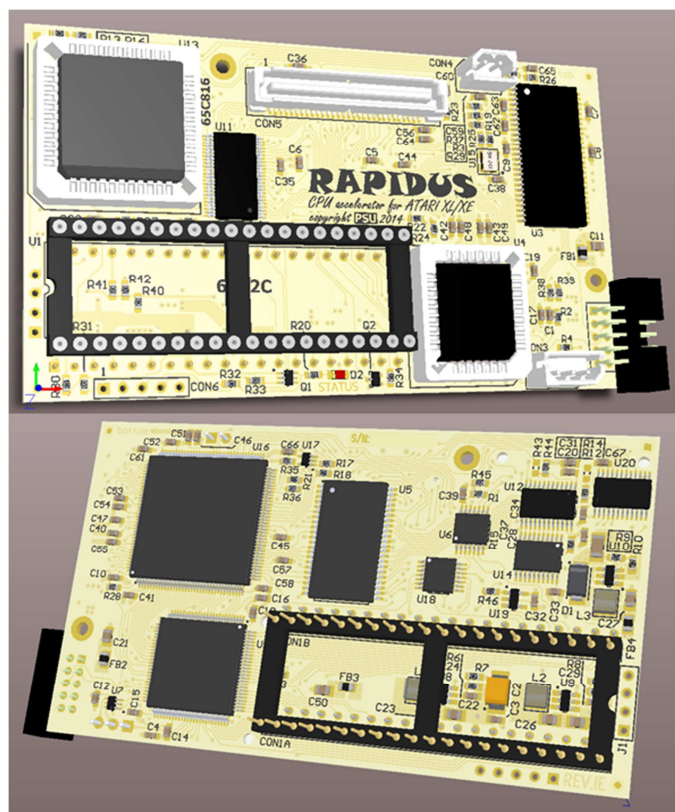# RAPIDUS

## Installation manual for ATARI XE/XEGS

Ver.1.2 – 05.04.2016



## www.lotharek.pl

**DISCLAIMER :**

- **Before any soldering inside computer; POWER OFF ATARI**
- **Disconnect all devices**
- **Use professional tools without any risk or possible harm to You**
- **If You are not sure what to do – go to PROF ! Do not solder on Your own.**
- **If You haven`t understood below pinouts – also visit PROF technician !**

**HISTORY:**

- ➢ 22.03.2016 - 1.0 – initial release
- ➢ 24.03.2016 – 1.1 – minor changes for XE
- ➢ 05.04.2016 – 1.2 – XEGS added, minor bugs fixed

**Dear RAPIDUS USER** ☺

Thank You very much for buying RAPIDUS card. You have just supported many people involved in almost 12 years long project development.  Rapidus  project was started in 2004 by Michał Pasiecznik  (Pasiu/SSG), and first public announcement was made in March of 2006 as F7 accelerator.  Since that time, Rapidus  project has been improved many times to reach present state.

**Device info:**

- internal CPU turbo card for Atari XE,
- WDC 65C816 microprocessor operating at **20 MHz !!!**
- managed by Xilinx Spartan6 FPGA and XC95XL CPLD devices,
- 512kb of zero waitstate SRAM,
- up to 30.5MB of storage ram - SDRAM clocked **160 MHz !!!**
- 512kB of Flash memory (256kB is reserved for fpga cores, 256kB for OS and New Device handler)
- 256b of EEPROM,
- high speed bus connector for external I/O interfaces, DMA support,
- working modes fully software controlled
- low power consumption due to DC/DC converters, no extra power supply required
- compatible with Ultimate 1MB,
- The 65C816 dediacted OS on board (http://drac030.krap.pl/en-specyfikacja.php)

**Hardware in action videos:**

- **https://www.youtube.com/watch?v=9w-S6sMyu-Q**  - Atari 8-bit demo Control running on Rapidus Accelerator
- **https://www.youtube.com/watch?v=b3RnBYsa_9M** - Rapidus and 6502
- **https://www.youtube.com/watch?v=RKgTVOEnKHk** -  Presentation of Rapidus Accelerator (**https://www.youtube.com/watch?v=Ef0_L0EnrG0** -  rotozoomer.pl @ 20MHz
- **https://www.youtube.com/watch?v=0TpQC7afQDo** - Let's Emu! - ZX Spectrum Emulator for Atari 8-bit. Now in colour!
- **https://www.youtube.com/watch?v=AJx_1JjEEWE** - Karateka - Atari XL/XE game running on 65C816 Accelerator Card
- **https://www.youtube.com/watch?v=q-zYBCamOB0** - Rapidus Accelerator - Atari Pokey chip FPGA implementation

Here we can learn how to connect Your brand new  RAPIDUS upgrade inside ATARI. Before You start, unplug ATARI from power supply or any external devices. It is very easy process and as long You have some soldering skills, we shouldn`t expect any troubles.
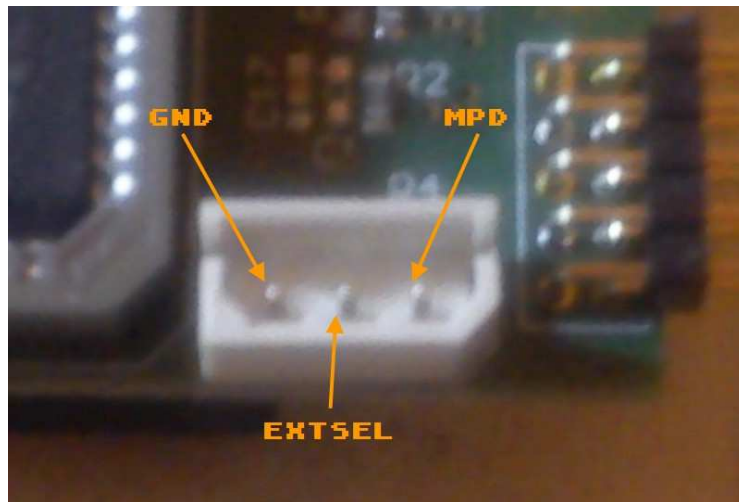
**The most important check,  prior to installation of RAPIDUS CARD is  " Freddie EXTSEL mod":**

- locate Freddie chip ([https://en.wikipedia.org/wiki/Atari_FREDDIE](https://en.wikipedia.org/wiki/Atari_FREDDIE))
- measure resistance between pin EXTSEL (pin 3)  and Vcc (pin 40)
    - ➢ if measured resistance is approx. 3 KOhm, You are ready to install RAPIDUS
    - ➢ if measured resistance is approx.  0 Ohm (direct connection) , please do :
        - o desolder freddie PIN 3
        - o lift it up
        - o connect it with 1,5-10 KOhm resistor to 5V (Freddie pin 40)
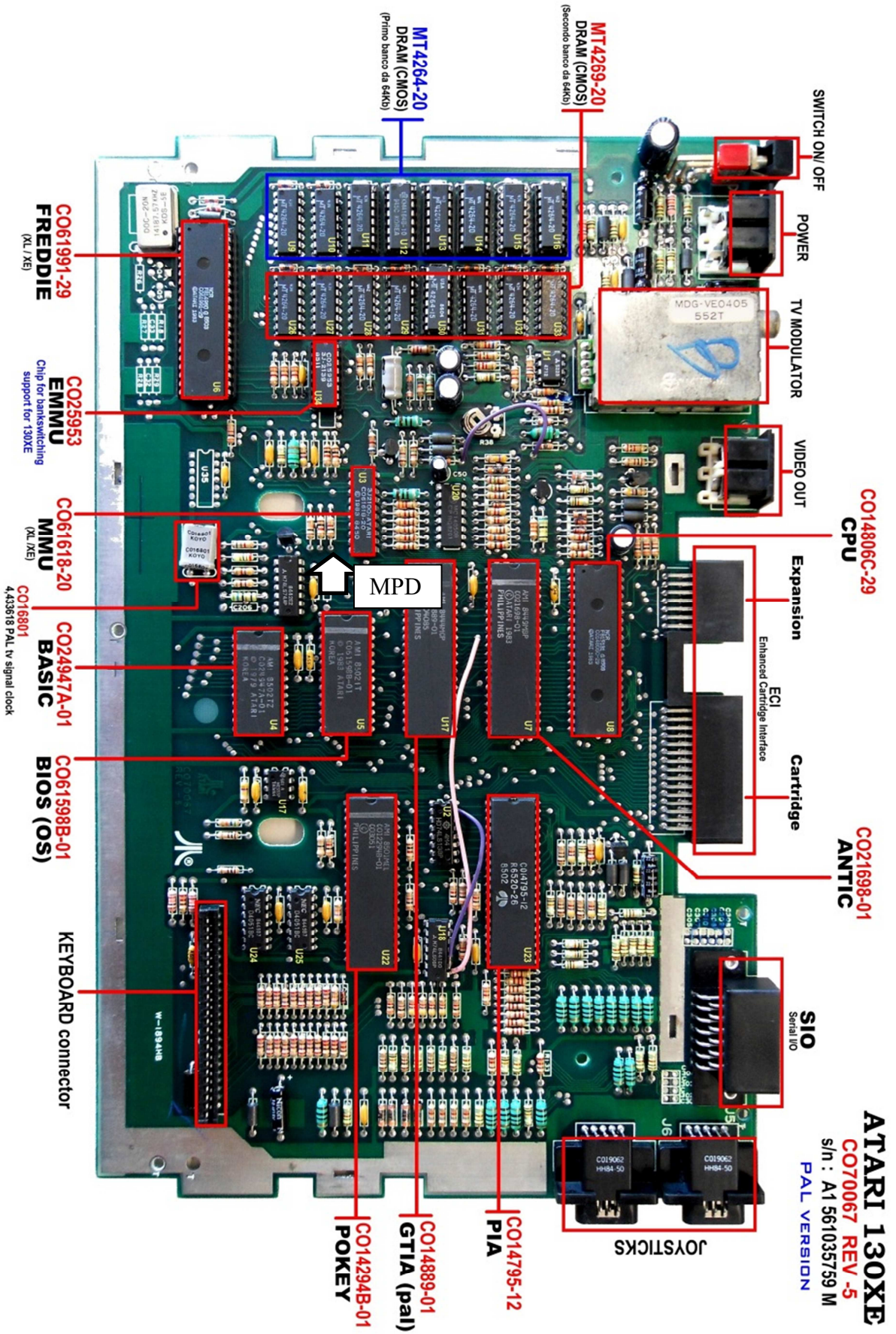        - o power on ATARI – it shall start as usually

**Explanation :**  in some ATARIs (XEGS, non ECI equipped 65XE) there is permanent connection to 5V, what is BAD. Direct connection of 5V may damage Your RAPIDUS. Of course, there is protection at RAPIDUS BOARD, but it will only save the FPGA/XILLINX . Nevertheless, RAPIDUS may not start again.

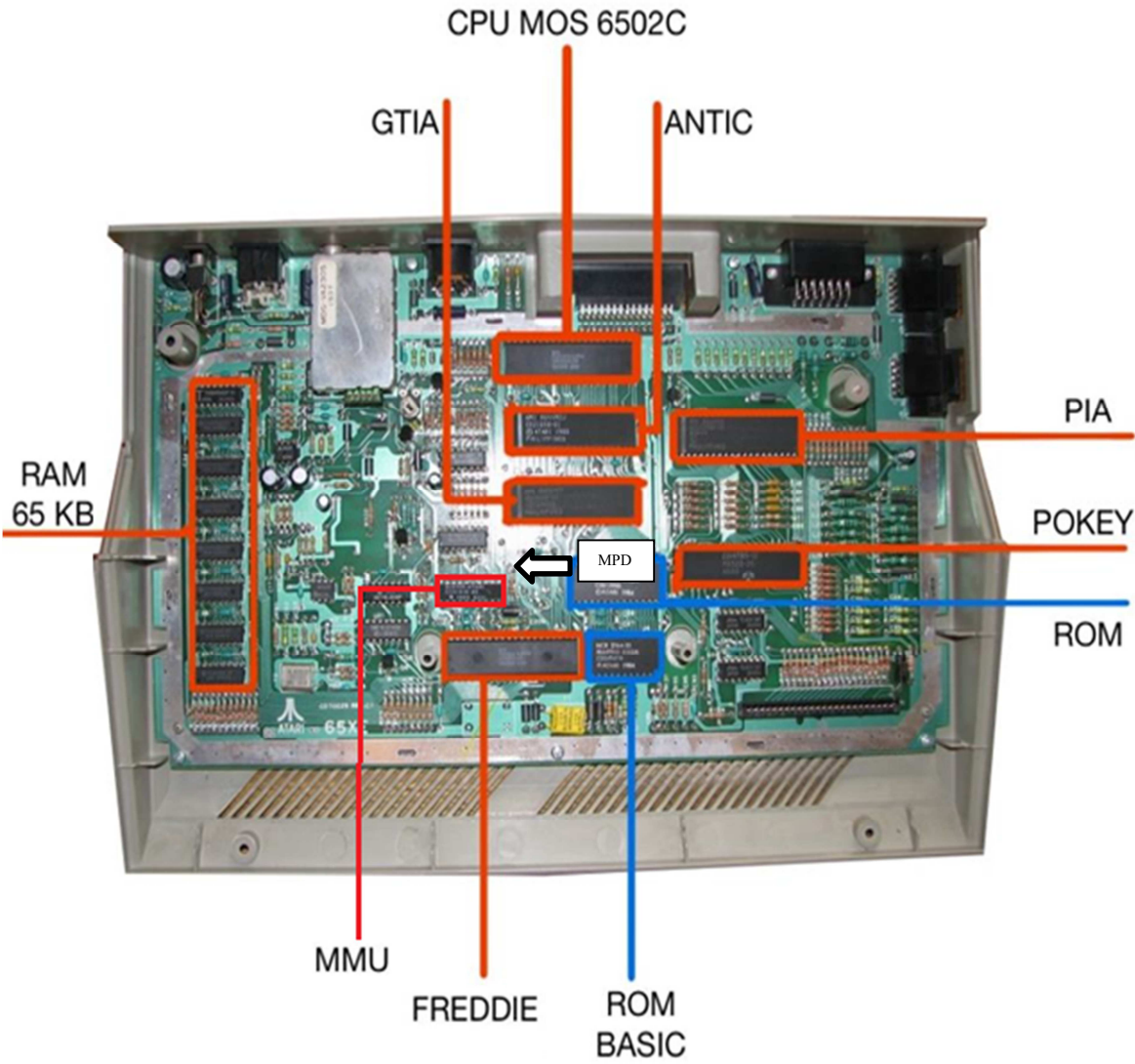**Installation of RAPIDUS BOARD in XE  ( NOT XEGS)**

1. If CPU is not socketed, de-solder  it carefully, solder socket back into mainboard
2. If CPU is  socketed, remove it from socket
3. Insert  RAPIDUS into CPU socket
4. Insert CPU into RAPIDUS
5. Power ON ATARI
6. If ATARI boots as usually, we are almost done
7. Solder three wires
   - **GND** – example – Freddie CHIP pin 20
   - **EXTSEL** – Freddie pin 3
   - **MPD** – MMU pin 14
   - **Ultimate USERS** – MPD signal may be taken from R15  (it is 3KOhm  resistor near MMU **– be careful here – other side is connected to 5V )**
8. Power on ATARI and ENJOY

MT4264-20
DRAM (CMOS)
(Primo banco da 64Kb)

MT4269-20
DRAM (CMOS)
(Secondo banco da 64Kb)

SWITCH ON/ OFF

POWER

CO61991-29
FREDDIE
(XL / XE)

TV MODULATOR

MDG-VEO405
552T

CO25953
EMMU
Chip for bankswitching
support for 130XE

VIDEO OUT

CO61618-20
MMU
(XL /XE)

CO14806C-29
CPU

MPD

CO16801
4,433618 PAL tv signal clock

Expansion

ECI
Enhanced Cartridge Interface

CO24947A-01
BASIC

Cartridge

CO61598B-01
BIOS (OS)

CO21698-01
ANTIC

KEYBOARD connector

SIO
Serial I/O

POKEY
CO14294B-01

GTIA (pal)
CO14889-01

PIA
CO14795-12

C019062
HH84-50

C019062
HH84-50

JOYSTICKS

ATARI 130XE
CO70067 REV -5
s/n : A1 56103575 9 M
PAL VERSION

**ATARI mainboard without ECI – Needs Freddie EXTSEL mod**



CPU MOS 6502C

GTIA

ANTIC

PIA

RAM 65 KB

POKEY

MPD

ROM

MMU

FREDDIE

ROM BASIC

**Installation of RAPIDUS BOARD in XEGS**

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6. If ATARI boots as usually, we are almost done
7. Solder three wires
   - ➢ **GND** – example – Freddie CHIP pin 20
   - ➢ **EXTSEL** – Freddie pin 3
   - ➢ **MPD** :
     - ✓ **Ultimate USERS:** MPD signal is under pcb at pin 14 of MMU socket and ultimate pcb must have no XEGS MODE selected (remove jumper)
     - ✓ **STOCK USERS**: You will need new GAL CHIP programmed with dedicated *.jed. file, then **replace old MMU with new one, lift up pin 14 and connect it to 5V with 1,5-10KOkm resistor**. Connect MPD signal to pin 14)
8. Power on ATARI and ENJOY
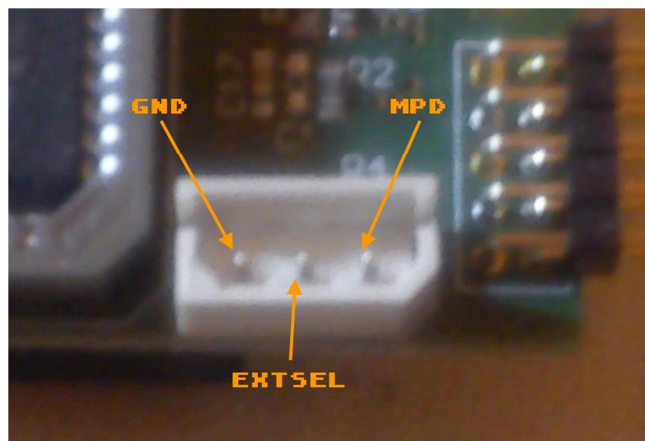
**ATARI XEGS - Needs Freddie EXTSEL mod**