RCA
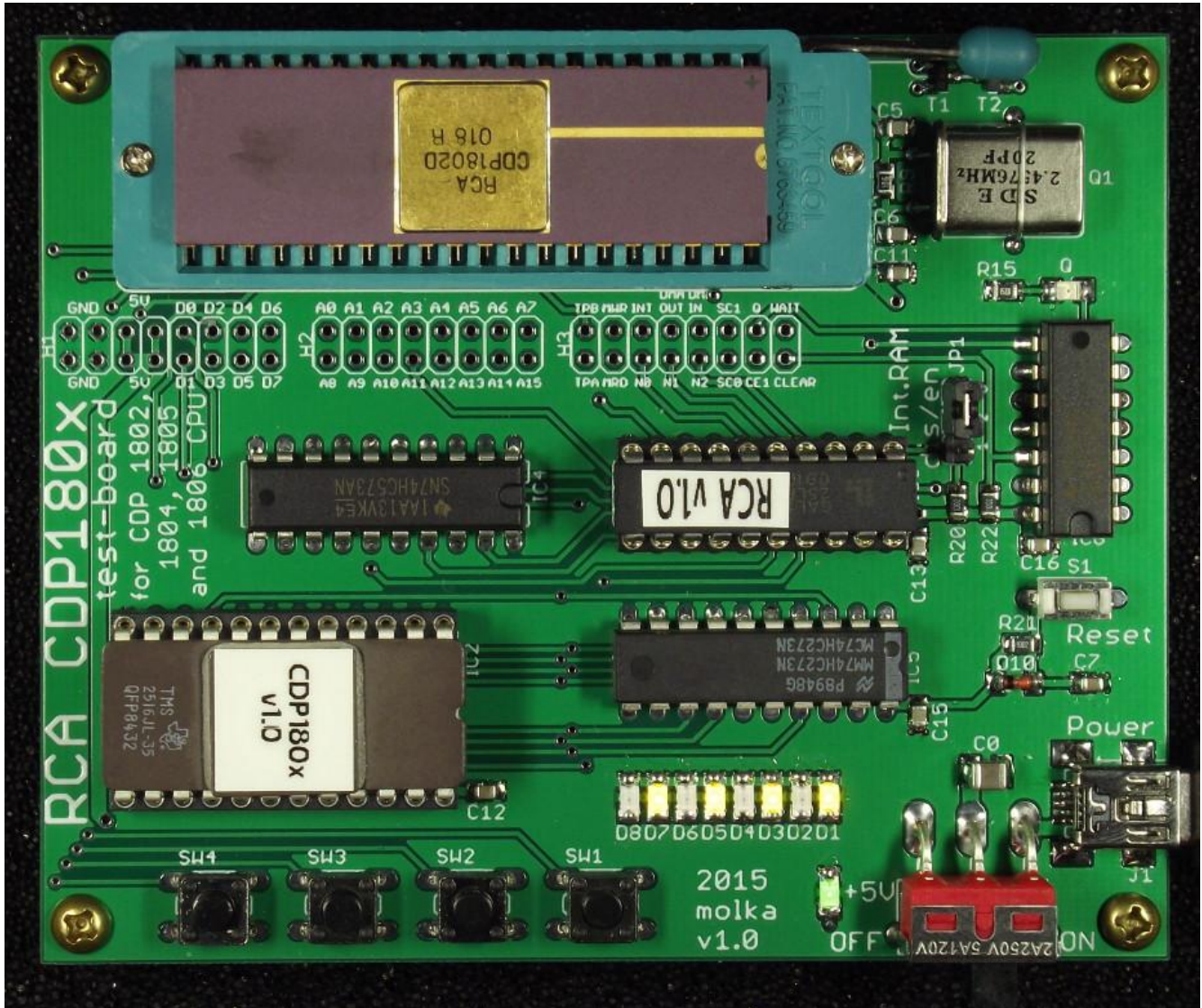# CDP180x

CDP1802 CPU Test board
User's Manual

Overview

The CDP1802 test board is intended to test the working condition of RCA CDP1802 COSMAC and compatible CPUs.

The board consists of the base components of RCA CDP1802 test system:

- 40-pin ZIF socket – for CDP1802 CPU – provides easy replacement of the CPUs.
- 2.4MHz crystal oscillator connected to CPU for generating system clock.
- Address latch for bits A15-A8 of address BUS

A 2716 2KB EPROM holds the test program. This program supports 4 push buttons as inputs, and 8 LEDs, as output devices. It also provides basic and special feature test routines.

The board requires a single +5V power supply (200mA) provided through a mini-USB connector.

There is a power switch and power indicator LED in the upper left corner of the test board.

Address, data, system control and power lines are attached to the three 16-pin expansion headers, so that the board may be used for other projects.

Board layout and parts
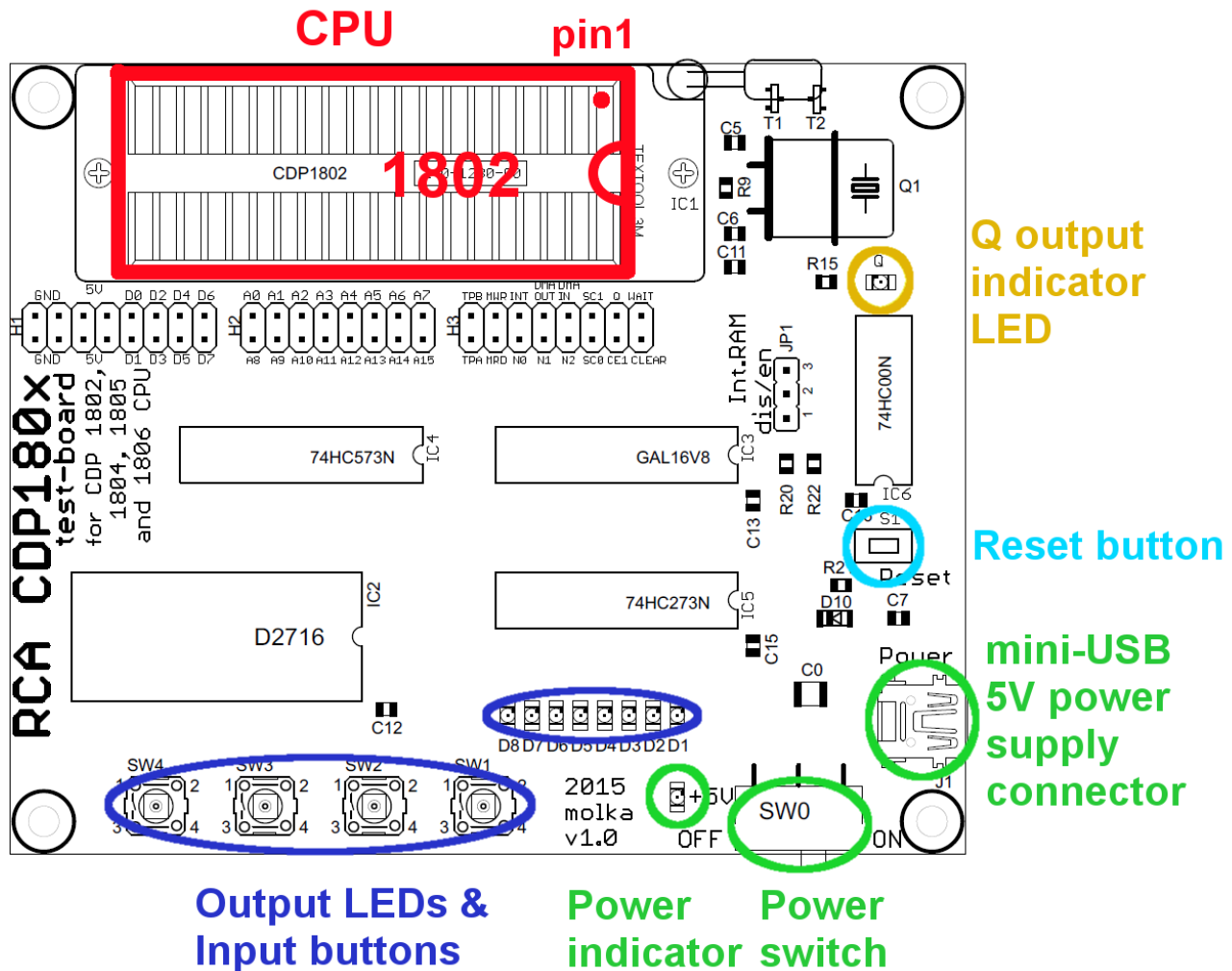
- **Mini-USB 5V power supply connector:** The board consumes around 200mA current so a computer USB connector or cell phone charger that can provide at least 300mA may be used as power source.
- **Switch:** Power supply can be turned on and off by the sliding switch at the bottom right corner.
- **Green LED:** next to the power switch, indicates the power level of 5V.
- **Reset Button:** The board contains a Power-Up reset circuit, but can be reset manually by pressing Reset button.
- **40-pin ZIF socket**: for the CDP1802 CPU. Ensure proper CPU orientation!!! The pin-1 is at upper-right corner, next to the release lever of the socket.
- **Red LED:** Labeled Q, indicates the status of the CPU output Q.
- **Eight output LEDs:** – Show simple animations, flashes – indicate that the CPU is working.
- **Four push buttons:** Used for testing inputs and changing animation sequences.

Usage

- Before changing the CPU in the ZIF socket, make sure the power is off. All power indicator LEDs should be off!
- Place the CPU into the socket (socket lever should be in the **UP** position). Ensure proper orientation to prevent damage to the test board and CPU! Pin 1 must be at the upper-right corner, next to the release lever of the ZIF socket. Then lock the socket by moving the lever down into the lock position.
- Connect the power through the USB connector and switch the power switch to ON.
- The three power indicator LEDs should be illuminated.
- If the CPU is in working condition the 8 output LEDs should be flashing (1s on/1s off pattern).
- At this point the CPU can be considered WORKING. Congrats!

Base function test

- When you press any of the four push buttons (SW1 – 4) the output LEDs copy the state of the buttons, duplicated in the low and high nibbles.
- Releasing the buttons causes one of the four different animation sequences to start, corresponding to the button released last.
- During the animations of SW2, SW3 the Q LED blinks periodically.

These test routines use the base instructions and features of CDP1802 CPU.

Special feature test

These test routines check if the inserted CPU can execute the enhanced instructions of CDP1804, 1805 and 1806 CPUs, then check the timer function and the internal RAM.

To activate the special feature test SW1 and SW4 should be pressed together and held for 3 seconds.

- First the enhanced instruction capability is tested and the result shown on LED D1& D2.
- Then the timer functionality is tested. It takes about 1s and the Q LED blinks rapidly during the test. The result is displayed on LED D3 & D7.
- Finally the internal RAM of CDP1805 is tested. The result is shown on LED D4 & D8.

D1 – CPU type 1802
D2 – CPU type 1804, 1805 or 1806
D3 – Timer OK
D4 – RAM OK
D7 – Timer failure
D8 – RAM failure

Troubleshooting

- After connecting the power supply the power indicator LED remains off. Turn off the power immediately!

  This may be caused by:
  - The power supply is unable to provide enough current. Check that it can provide at least 200mA. (300-400mA recommended)
  - Thin, poor quality USB cable can also cause this problem.
  - There is short-circuit (fault) in the CPU.

- The 8 output LEDs do not start flashing.
  - Press the Reset button. If the output LEDs continue to remain off then the CPU may be faulty.

Tested CPUs:

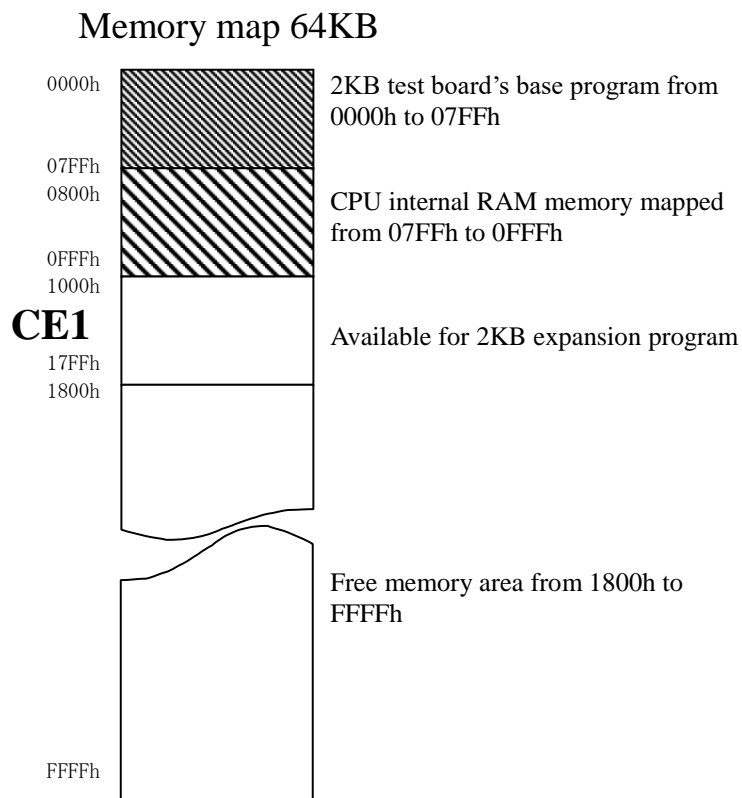| Manufacturer	Variant
RCA	CPD1802D
	CPD1802CD
	CPD1802CE
	CPD1802ACE
	CPD1802BCE
	CPD1805ACE
Hughes Aircraft	HMMP1802CD
	HC1802A-C-P-000
Harris	CPD1802ACE
	CPD1806ACE
Intersil	CPD1802ACE

Other compatible CPU's should be testable as well, but have not yet been verified.

Expansion

The following lines are connected to the expansion headers (H1-H3):
- DATA D0-7
- ADDRESS A0-15
- TPA, TPB
- MRD, MWR
- N0, N1, N2
- INT, DMA-OUT, DMA-IN
- SC0, SC1
- Q
- CLEAR, WAIT
- CE1 – chip enable at address range 1000h-17ffh
- POWER +5V, GND

Memory organization

Memory map 64KB

0000h — 2KB test board's base program from 0000h to 07FFh

07FFh
0800h — CPU internal RAM memory mapped from 07FFh to 0FFFh

0FFFh
1000h

CE1 — Available for 2KB expansion program

17FFh
1800h

Free memory area from 1800h to FFFFh

FFFFh

IO organization

IO ports are selected by lines N[0-2]
Input ports:
    1-7 are not used
Output ports:
    1 is used for LED display
    2-7 are not used

Status input lines EF[1-4] are used
    as input of buttons SW[1-4]

Thanks to CPUShack for review and advises!

Feel free to write an e-mail to me at molnar.kalman@freemail.hu or send a PM to molka at CPU-World forum if you have any question.