How to Transfer a compiled Program to the MikroLeo

(using Arduino Mega 2560)

Connection Steps:

1) Turn-off MikroLeo (The power on is indicated by LED1) - Figure 1
2) Connect MikroLeo (J8, J17, J18, J26 and J27) with Arduino Mega - Figure 1 and Figure 2
3) Connect Arduino with a PC (with USB 2.0 Cable Type A/B) - Figure 2
4) Change the operation to Manual mode (SW3 - close pins GND-MANUAL) - Figure 1
5) Disable the Instruction Decoder (J29 - close pins 1-2) - Figure 1
6) Open the jumper (J7) - Figure 1
7) Close the pins C-2k of jumper (J3) - Figure 1
8) Close the pin $\phi 1$ with the central pin of jumper (J63) - Figure 1
9) Close the pins CLK-Delay of jumper (J64) - Figure 1
10) Turn-on MirkoLeo - Figure 1

Note: Once this is done, it is no longer necessary to turn it off and on again to transfer another program. Steps 7, 8 and 9 are a pre-configuration, and they will stay connected like this.

The number of connection steps is indicated in the figures below.

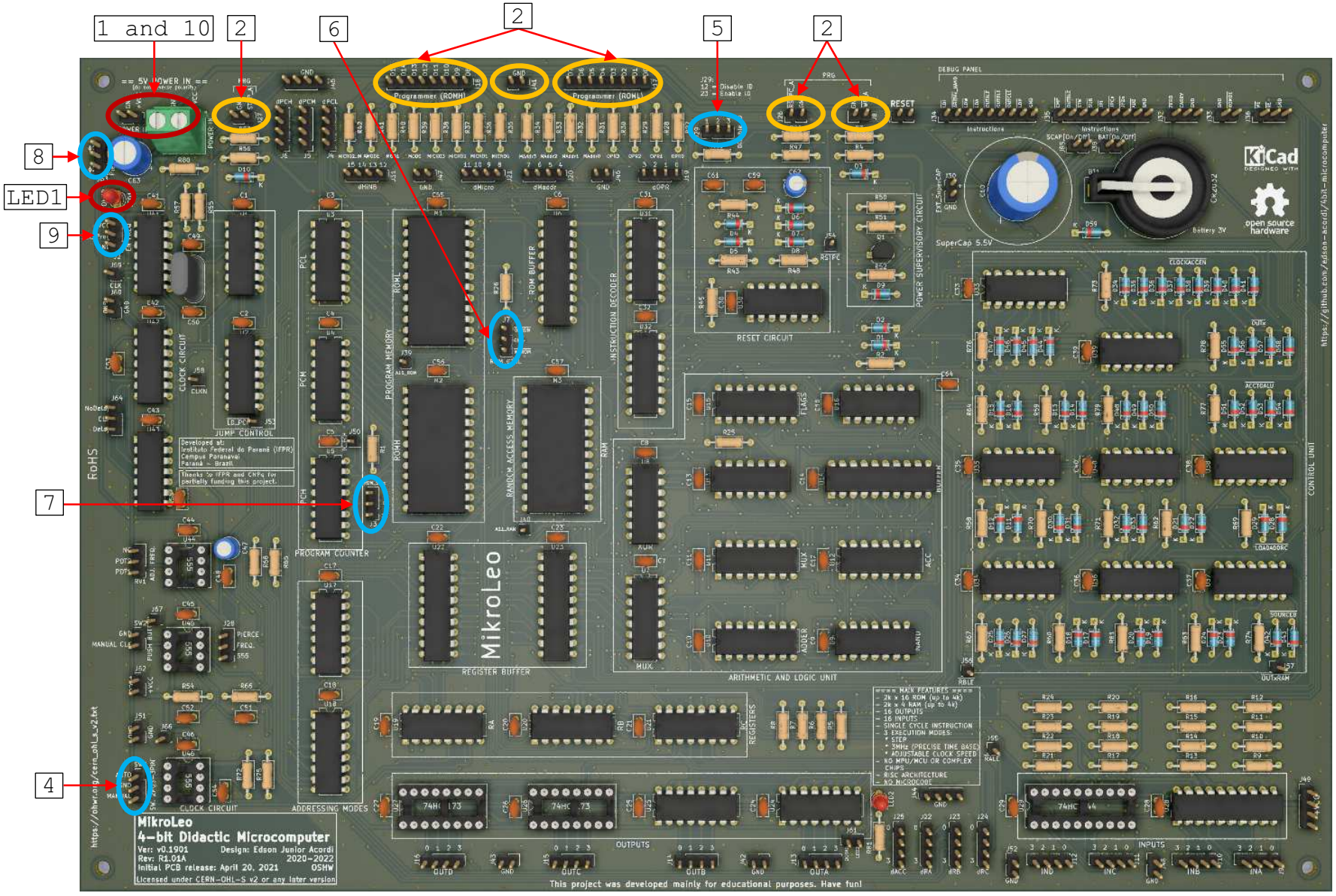

Figure 1 - MikroLeo PCB

Details of Step 2 (Connection of MikroLeo - J8, J17, J18, J26 and J27 - with Arduino Mega):

Connections		
Arduino	MikroLeo	
A8	D8	Programmer (ROMH) J18
A9	D9	
A10	D10	
A11	D11	
A12	D12	
A13	D13	
A14	D14	
A15	D15	
9	STEP_A (J27)	
10	$\overline{\text{RSTPC\_A}}$ (J26)	

Connections		
Arduino	MikroLeo	
A0	D0	Programmer (ROML) J17
A1	D1	
A2	D2	
A3	D3	
A4	D4	
A5	D5	
A6	D6	
A7	D7	
GND	GND	
11	$\overline{\text{WE\_A}}$ (J8)	

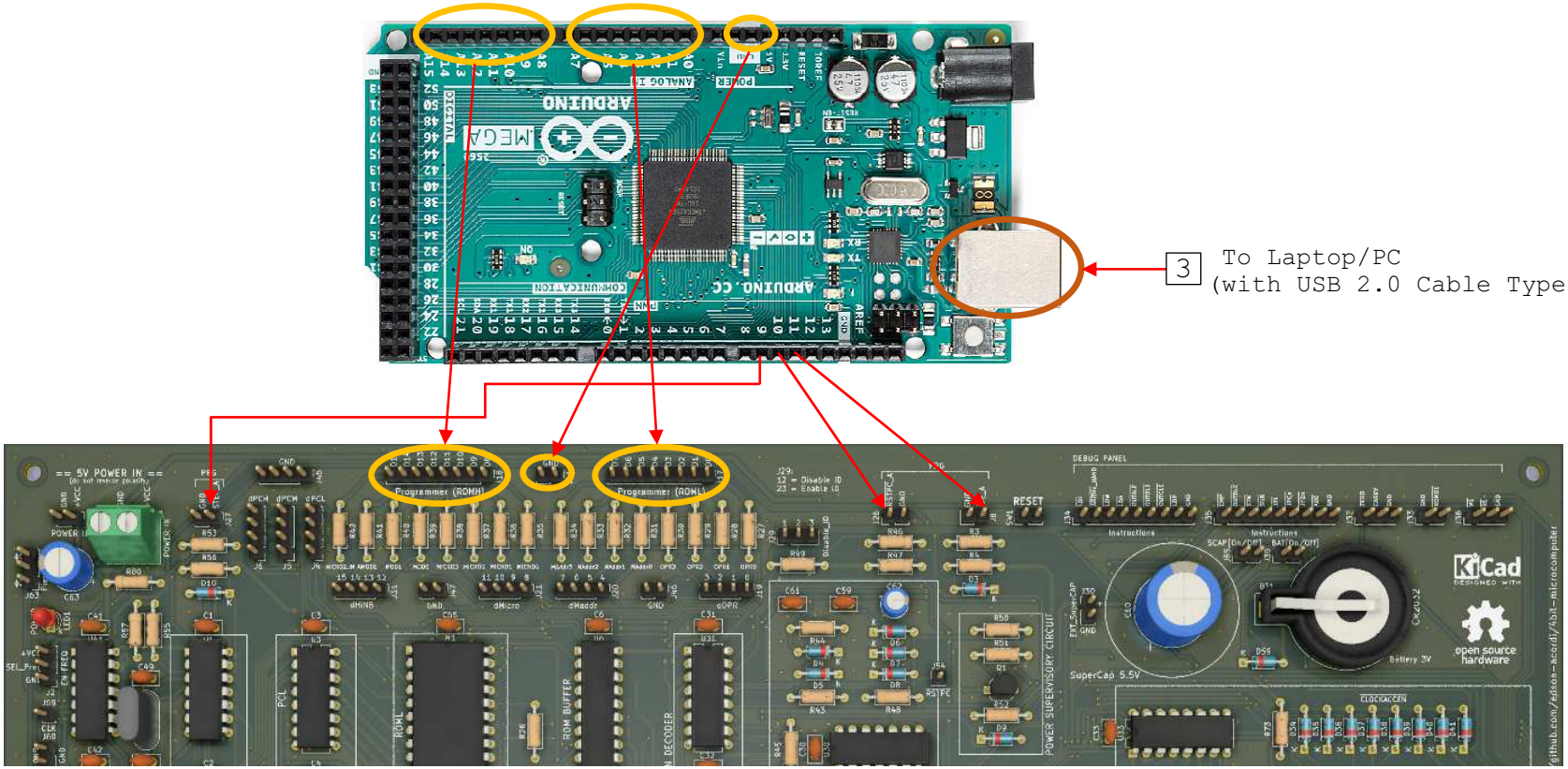

Figure 2 - Connection of MikroLeo with Arduino

Software Steps:

1) Run Arduino IDE - Figure 3

   (If you don't have it, you need to install it first, https://www.arduino.cc/en/software)

2) Open the program "MikroLeo_Program_Writring.ino" - Figure 3

   (download "MikroLeo_Program_Writring.ino",

https://github.com/edson-acordi/4bit-microcomputer/raw/master/Arduino/MikroLeo_Program_Writring.ino)

3) Select the Arduino Mega 2560 board - Figure 4

4) Select the COM port - Figure 5

5) Copy the compiled program, on the section "Code to be transferred to the MikroLeo (using Arduino)" - Figure 6

6) Paste the compiled program to the array "program_dat[] = {}" in the Arduino program "MikroLeo_Program_Writring.ino" - Figure 7

7) Transfer the program to MikroLeo - Figure 8

Arduino IDE,

Figure 3 - Arduino IDE

Configuring Arduino IDE (board),

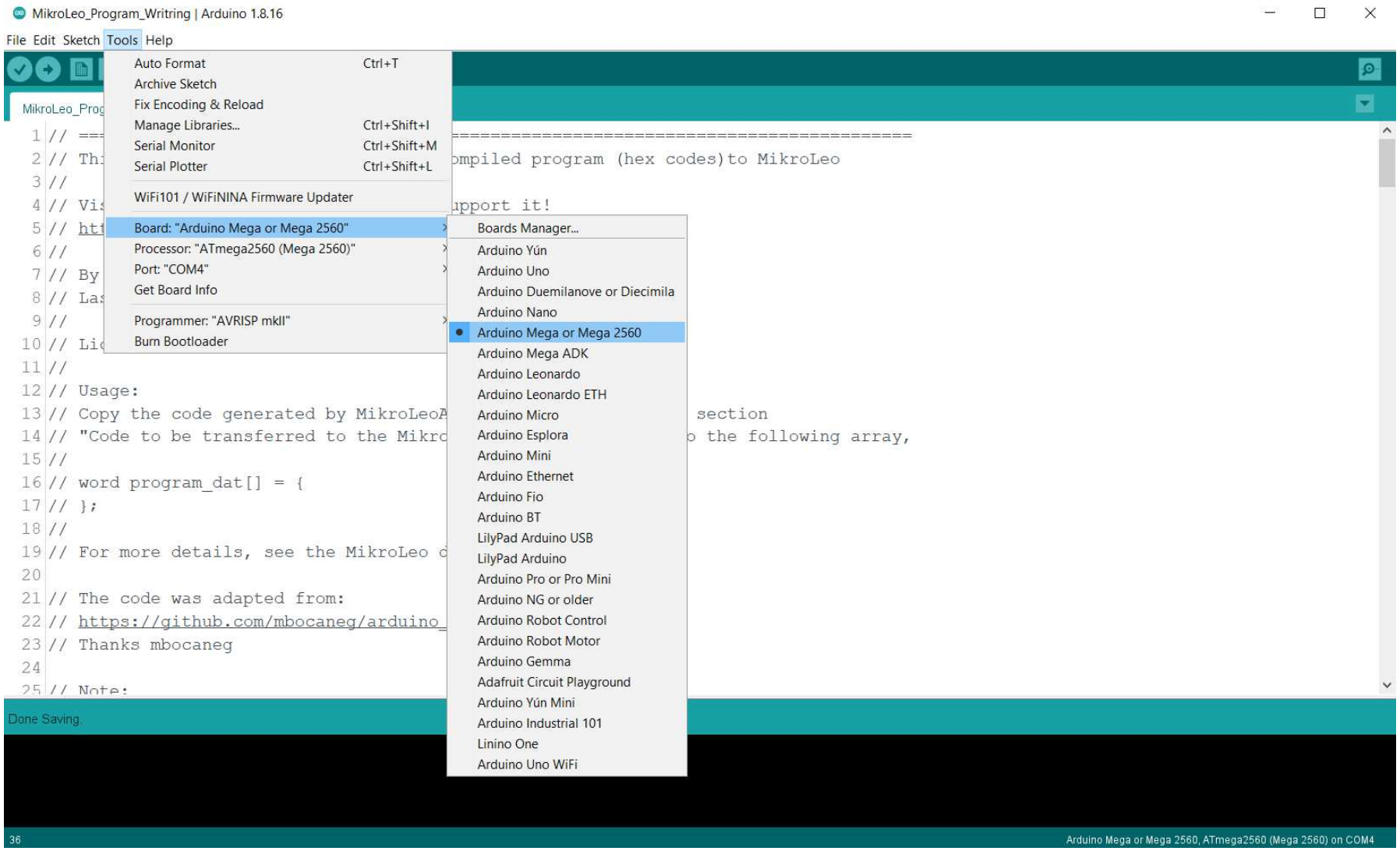

Figure 4 - Select the Arduino Mega 2560 board

Configuring Arduino IDE (COM port),

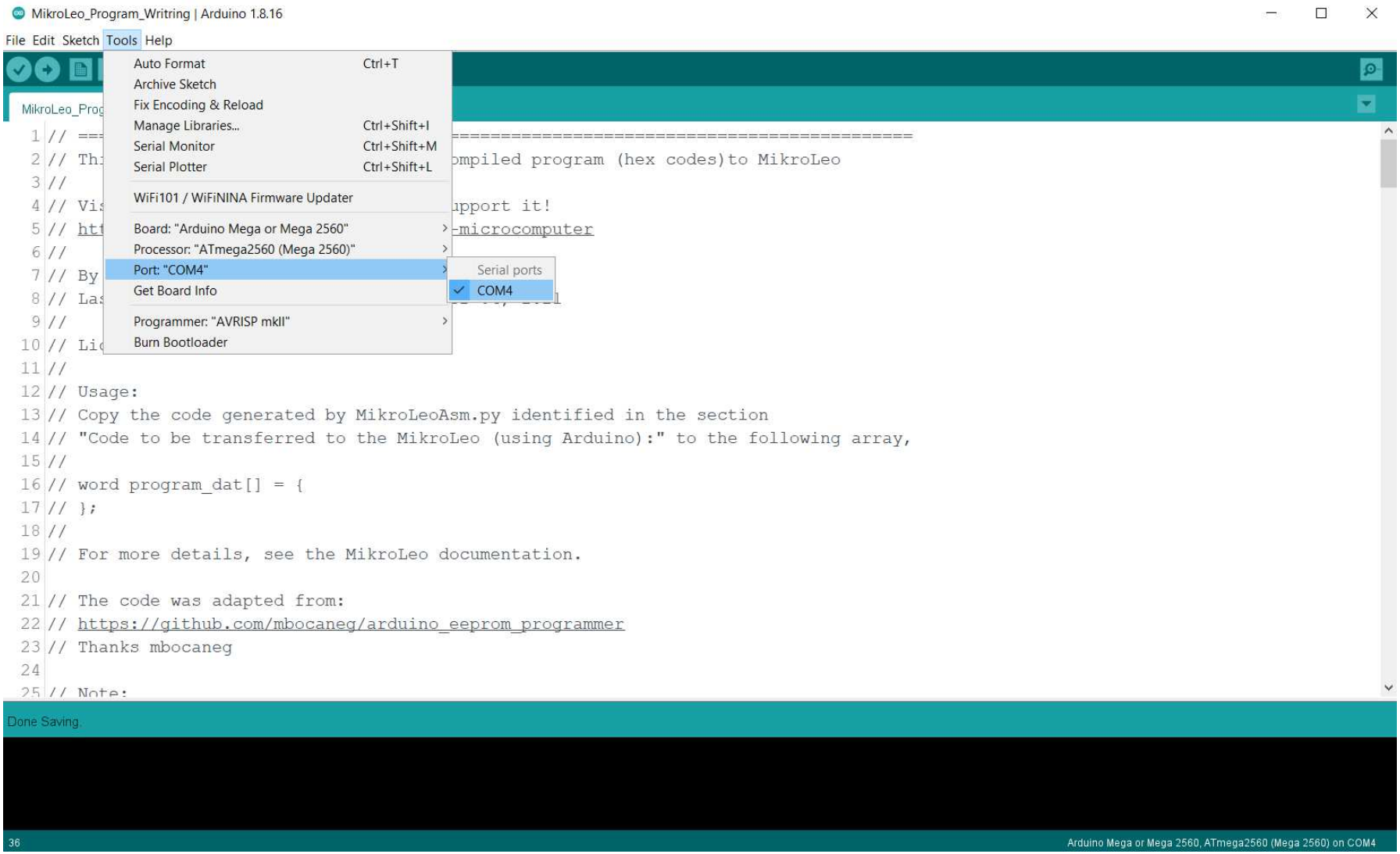

Figure 5 - Select the COM port

Copy the code marked below, on the section "Code to be transferred to the MikroLeo (using Arduino),

Note: To compile a program, see the MikroLeo documentation.

```
Line: 1  => []
Line: 2  => []
Line: 3  => []
Line: 4 Loop: => []
Line: 5 LDI ACC 1 => ['LDIACC', '1']
Line: 6 JPI Loop => ['JPI', 'LOOP']
Line: 7  => []

Label Address:  LOOP =>  0x0

LOOP:
0000: 0001 LDI ACC,1
0001: 0c00 JPI Loop

Code to be transferred to the MikroLeo (using Arduino):
0x0001, 0x0c00

Binary code to be manually programmed:

2 Instructions were coded! (MikroLeo v0.19)

Code to be loaded into the Program Memory Micro2 (ROMH) on the software Digital:
v2.0 raw
00 0c

Code to be loaded into the Program Memory Micro1 (ROML) on the software Digital:
v2.0 raw
01 00

Files to be loaded into Program Memory (Micro2 and Micro1):
 LDI_ACC_Test_Micro2.hex
 LDI_ACC_Test_Micro1.hex
```

Figure 6 - Compiled program

Then paste it in the array "program_dat[] = {}" in the Arduino program, "MikroLeo_Program_Writring.ino",

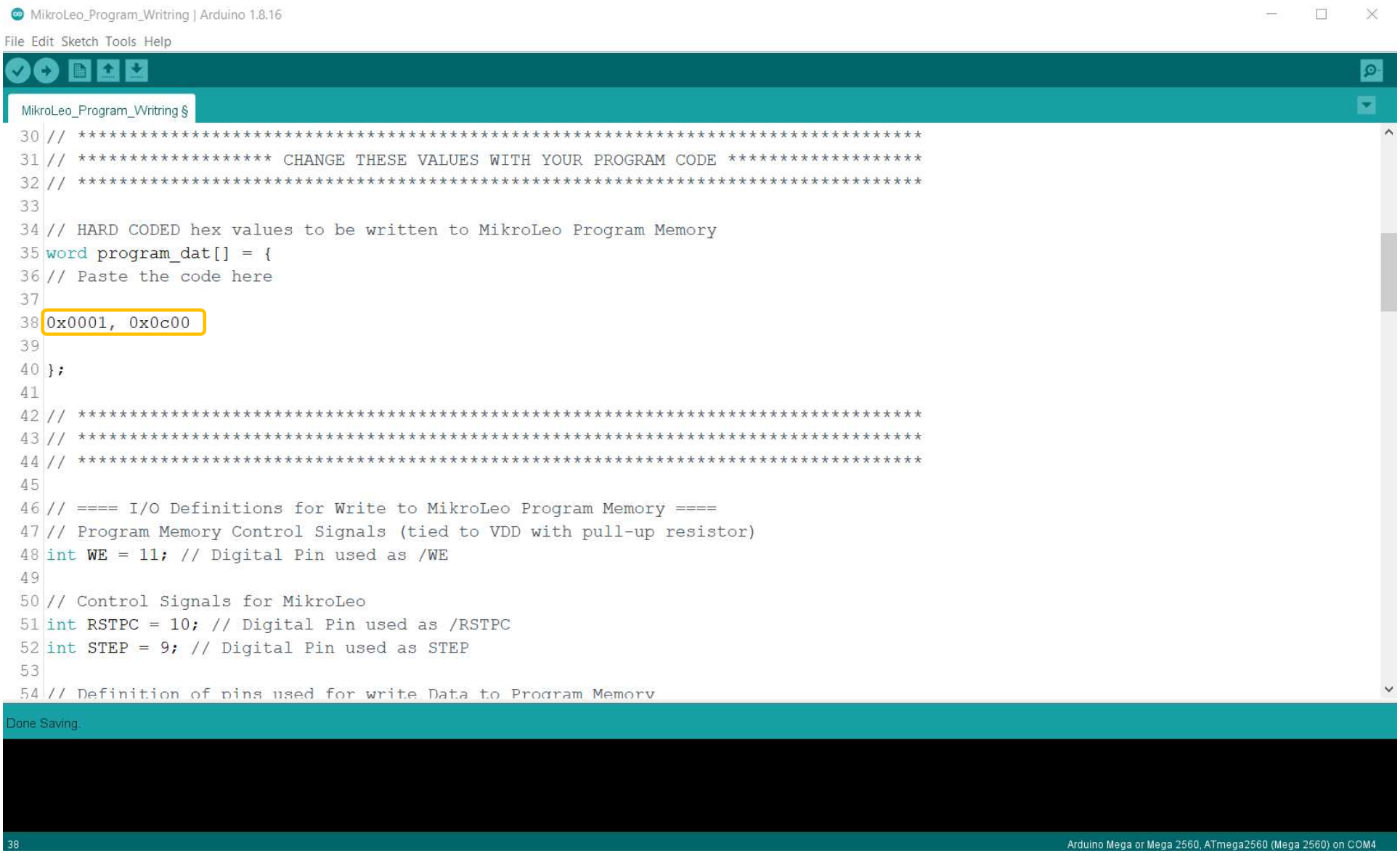

Figure 7 - Paste the compiled program to the array "program_dat[] = {}"

Finally, press <CRTL-U> or click on "Upload" (make sure you have connected MikroLeo and Arduino and powered both). The transfer is relatively fast, look in the "Message Window" of the Arduino IDE, to see if the upload was done. Also check that the LEDs on the Arduino board have stopped blinking.

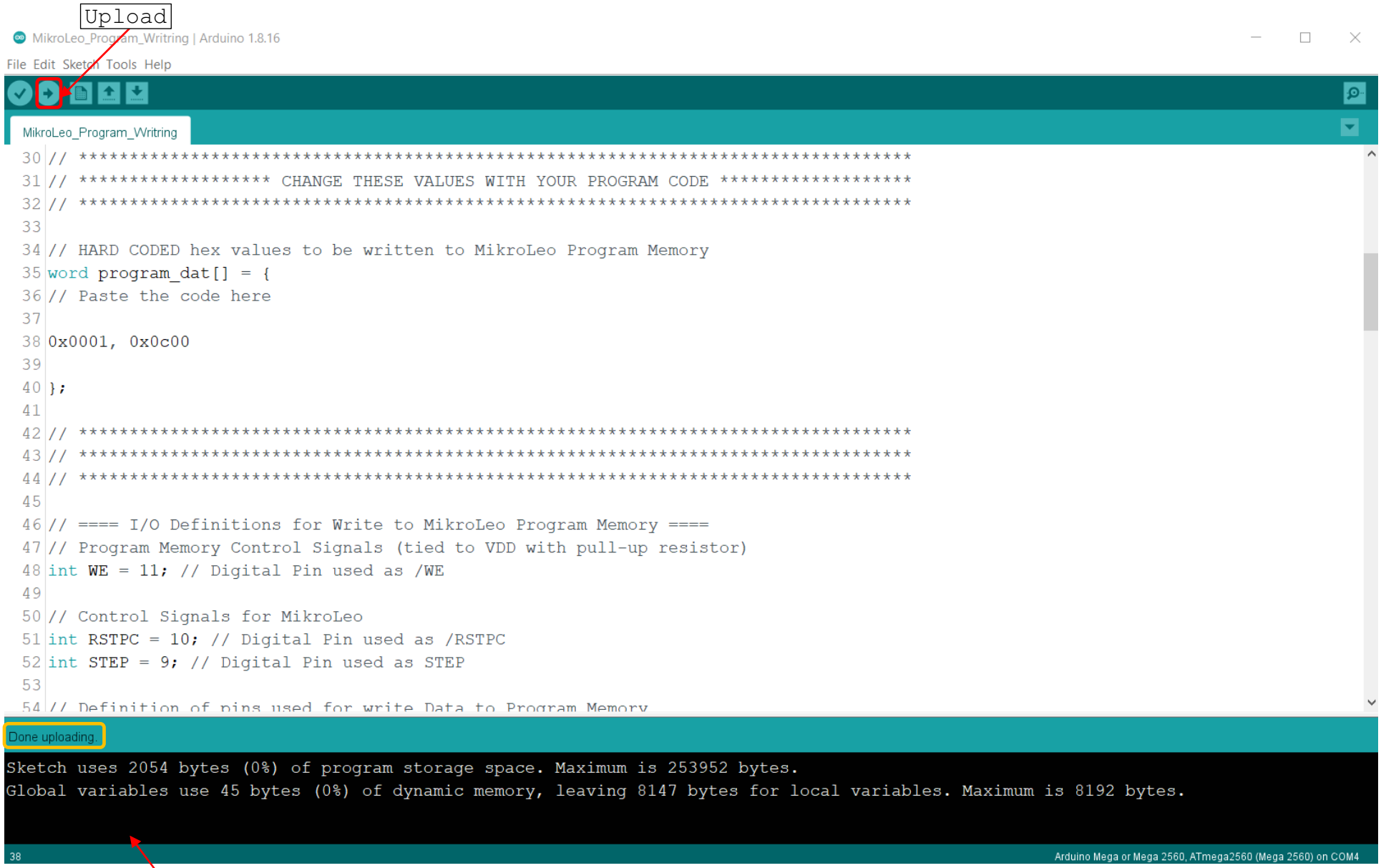

Figure 8 - Transfering the Program to MikroLeo

How to Run downloaded program in MikroLeo

MikroLeo PCB Configuration Steps:

Note: Considering that you have just transferred a program to MikroLeo,

1) Close the pins $\mathrm{GND} - \overline{\mathrm{OEROM}}$ of jumper (J7) - Figure 9

2) Enable the Instruction Decoder (J29 - close pins 2-3) - Figure 9

3) Reset the MikroLeo (a pushbutton connected to the jumper pins SW1 can be used)

4) If you want to RUN in AUTO mode, select a Clock source - Figure 9:

   - To Run the program with 555 (adjustable slow speed), close the pins 555-FREQ of jumper (J28);

   - To Run the program with Pierce oscillator, close the pins FREQ.-PIERCE of jumper (J28);

   - Finally, close the pins AUTO-GND of jumper (SW3).

5) Or to RUN in step by step mode, use a push button connected to the pins GND-MANUAL CLK of jumper (SW2)

Note: It is not necessary to disconnect MikroLeo-Arduino.

The number of configuration steps is indicated in the figures below.

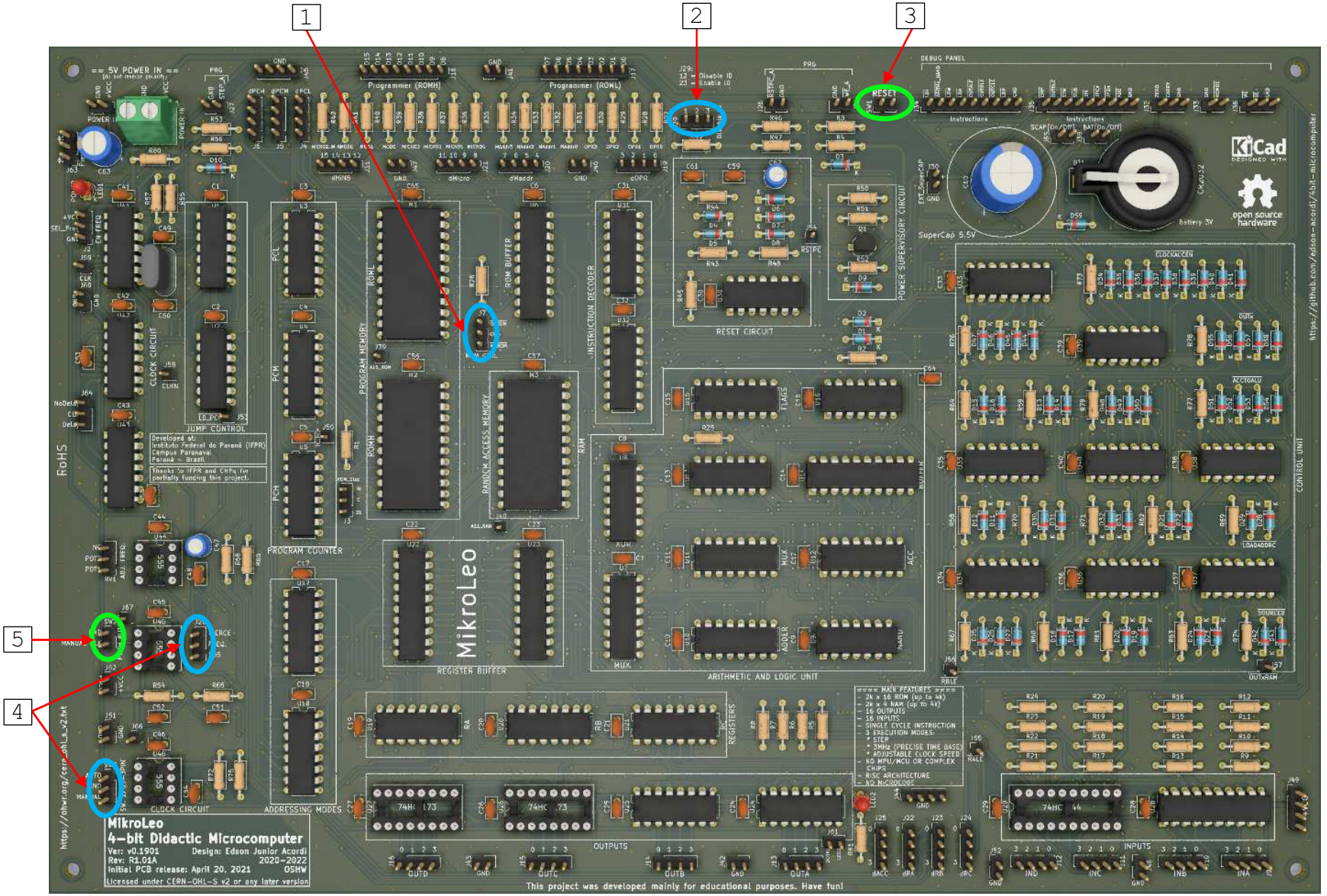

Figure 9 - Configuring the MikroLeo board to run a program