



Hector M. Diaz



TECNICO ELECTRICISTA



Industrial Electromechanics



Design & Integration
Photovoltaic Systems

1 ; Hector M. Diaz tank controller:temperature and level.

2 R_0

3 ; Prepar

4 R_0

5 [AA0 50]

PLC Configuration

Cycle Time (ms): 10.0

Crystal Frequency (MHz): 16.000000

UART Baud Rate (bps): 19200

Serial (UART) will use pins 2 and 3.

The cycle time for the 'PLC' runtime generated by LDmicro is user-configurable. Very short cycle times may not be achievable due to processor speed constraints, and very long cycle times may not be achievable due to hardware overflows. Cycle times between 10 ms and 100 ms will usually be practical.

The compiler must know what speed crystal you are using with the micro to convert between timing in clock cycles and timing in seconds. A 4 MHz to 20 MHz crystal is typical; check the speed grade of the part you are using to determine the maximum allowable clock speed before choosing a crystal.

6 {UART RECV} [iC ==] [iC ==] Rlow1 [iC ==] ["c1\r"]

7 [iC ==] ["x\r"] AA0 ["x\4\r"]

8 [iC ==] [iC ==] YPH3 ["B1\r"]

9 [iC ==] [iC ==] YPH3 ["B0\r"]

10 [m1 ==] [m1 ==] {m1 :=} {m1 :=}

11 [m1 ==] [m1 ==] YPH3 (S)

12 [m1 ==] [m1 ==] YPH3 (R)

Primer paso seleccionar cycle time,crystal frequency,UART baud

| Name | Type | State | Pin on Processor | MCU Port |
|-------------------------------|---------------------|-----------------------------|------------------|----------|
| Atmel AVR ATmega2560 100-TQFP | cycle time 10.00 ms | processor clock 16.0000 MHz | | |

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6 {UART RECV} [iC ==] [iC ==] Rlow1 [iC ==] ["c1\r"]

7 [iC ==] ["x\r"] AA0 ["x\4\r"]

8 [iC ==] [B] YPH3 ["B1\r"]

[iC ==] [O] [iC ==] [P]

7 [m] 1

8 [m] 0

Una vez seleccionado pulsar ok

| Name | Type | State | Pin on Processor | MCU Port |
|-------------------------------|---------------------|-----------------------------|------------------|----------|
| Atmel AVR ATmega2560 100-TQFP | cycle time 10.00 ms | processor clock 16.0000 MHz | | |



LDmicro - Program Editor - C:\Users\hdiaz\Desktop\arduino\plc\tanques\hproject\tanques\hdfinal tanque.ld

File Edit Settings Instruction Simulate Compile Help

MCU Parameters...
Microcontroller

- Atmel AVR ATmega2560 100-TQFP
- Atmel AVR ATmega128 64-TQFP
- Atmel AVR ATmega64 64-TQFP
- Atmel AVR ATmega162 40-PDIP
- Atmel AVR ATmega32 40-PDIP
- Atmel AVR ATmega16 40-PDIP
- Atmel AVR ATmega8 28-PDIP
- Atmel AVR ATmega48 28-PDIP
- Atmel AVR ATmega88 28-PDIP
- Atmel AVR ATmega168 28-PDIP
- Atmel AVR ATmega328 28-PDIP
- Atmel AVR ATmega164 40-PDIP
- Atmel AVR ATmega324 40-PDIP
- Atmel AVR ATmega644 40-PDIP
- Atmel AVR ATmega1284 40-PDIP
- Microchip PIC16F628 18-PDIP or 18-SOIC
- Microchip PIC16F88 18-PDIP or 18-SOIC
- Microchip PIC16F819 18-PDIP or 18-SOIC
- Microchip PIC16F877 40-PDIP
- Microchip PIC16F876 28-PDIP or 28-SOIC
- Microchip PIC16F887 40-PDIP
- Microchip PIC16F886 28-PDIP or 28-SOIC
- ANSI C Code
- Interpretable Byte Code
- (no microcontroller)

Selecciona el microprocesador

Name Type State Pin on Processor MCU Port

Atmel AVR ATmega2560 100-TQFP cycle time 10.00 ms processor clock 16.0000 MHz

10:16 PM 11/22/2019

LDmicro - Program Editor - C:\Users\hdiaz\Desktop\arduino\plc\tanques\hdproject\tanques\hdfinal tanque.ld

File Edit Settings Instruction Simulate Compile Help

1 ; Hector M. Insert Comment ;

2 R_osc Insert Contacts C

3 ; Prepare v Insert OSR (One Shot Rising) L

4 R_osc Insert OSF (One Shot Falling) \

5 [AA0 >] Insert TON (Delayed Turn On) O

6 { 500 } Insert TOF (Delayed Turn Off) F

7 { 1 } Insert RTO (Retentive Delayed Turn On) T

8 { 0 } Insert CTU (Count Up) U

Insert CTD (Count Down) I

Insert CTC (Count Circular) J

Insert EQU (Compare for Equals) =

Insert NEQ (Compare for Not Equals)

Insert GRT (Compare for Greater Than) >

Insert GEQ (Compare for Greater Than or Equal) .

Insert LES (Compare for Less Than) <

Insert LEQ (Compare for Less Than or Equal) ,

Insert Open-Circuit

Insert Short-Circuit

Insert Master Control Relay

Insert Coil L

Insert RES (Counter/RTO Reset) E

Insert MOV (Move) M

Insert ADD (16-bit Integer Add) +

Insert SUB (16-bit Integer Subtract) -

Insert MUL (16-bit Integer Multiply) *

Insert DIV (16-bit Integer Divide) D

Insert Shift Register

Insert Look-Up Table

Insert Piecewise Linear

Insert Formatted String Over UART

Insert UART Send

Insert UART Receive

Insert Set PWM Output

Insert A/D Converter Read P

Insert Make Persistent

Make Normal A

Make Negated N

Make Set-Only S

Make Reset-Only R

Name Processor MCU Port

Atmel AVR ATmega2560 100-TQFP cycle time 10.00 ms processor clock 16.0000 MHz

10:20 PM 11/22/2019

Las intrucciones de programacion

LDmicro - Program Editor - C:\Users\hdiarz\Desktop\arduino\plc\tanques\hdproject\tanques\hdfinal\tanque.ld

File Edit Settings Instruction Simulate Compile Help

Simulation Mode Ctrl+M
Start Real-Time Simulation Ctrl+R
Halt Simulation Ctrl+H
Single Cycle Space

1 ; Hector M. Díaz tank

2 R_osc TOSC_on T_osc_off R_osc
---[/]---[TON 100.0 ms]---[TOF 100.0 ms]---()

3 ; Prepare variable

4 R_osc AA0
---[]---{READ ADC}

5 Rlow1
---()

6 Yph4
---()

7 {m1} :=
[1] MOV

8 {m1} :=
[0] MOV

YPH3 (S)

YPH3 (R)

La parte para simular el proyecto

| Name | Type | State | Pin on Processor | MCU Port |
|---|------|-------|------------------|----------|
| Atmel AVR ATmega2560 100-TQFP | | | | |
| cycle time 10.00 ms processor clock 16.0000 MHz | | | | |

Windows taskbar: 10:23 PM 11/22/2019

LDmicro - Program Editor - C:\Users\hdiaz\Desktop\arduino\plc\tanques\hdproject\tanques\hdfinal\tanque.ld

File Edit Settings Instruction Simulate Compile Help

Compile F5
Compile As...

1 ; Hector M. Diaz tank control

2 R_osc TOSC_on T_osc_off
---[/]---[TON 100.0 ms]---[TOF 100.0 ms]

3 ; Prepare variable

4 R_osc

5 [AA0 >]
[500]

6 ic [ic ==] [ic ==] Rlow1 [c1\r"]
[UART_RECV] [13] [c ==] [c ==] Rlow1 [c0\r"]
["X"] AA0 ["X\4\r"]
[c ==] YPH3 ["B1\r"]
["B"] YPH3 ["B0\r"]
[c ==] ["O"]
[c ==] ["P"]

7 [m1 ==]
[1]

8 [m1 ==]
[0]

YPH3 (S)
YPH3 (R)

Salvar en .hex

Arduino Mega-1

prototipetank.ld

```
1 LDmicro0.1
2 MICRO=Atmel AVR ATmega2560 100-TQFP
3 CYCLE=10000
4 CRYSTAL=16000000
5 BAUD=19200
6 COMPILED=D:\hdproject\tanques\hdfinal\tanque_eje.hex
7
8 IO LIST
9 YPH3 at 15
10 Yph4 at 16
11 AA0 at 97
12 END
13
14 PROGRAM
15 RUNG
16 COMMENT Hector M. Diaz tank controller:temperature and level.
17 END
18 RUNG
19 CONTACTS R_osc 1
20 TON Tosc_on 100000
21 TOF T_osc_off 100000
22 PARALLEL
23 COIL R_osc 0 0 0
24 CTC Cnt 1
25 END
26 END
27 RUNG
28 COMMENT Prepare variable
29 END
30 RUNG
31 CONTACTS R_osc 0
32 READ_ADC AA0
33 END
34 RUNG
35 GRT AA0 500
36 PARALLEL
37 COIL Rlow1 0 0 0
38 COIL Yph4 0 0 0
39 END
40 END
41 RUNG
42 UART_RECV ic
43 EOU ic 13
44
```

Ready
File: D:/tanques/hdproject/tanques/prototipetank.ld

| Name | Type | State | Pin on Processor | MCU Port |
|-------------------------------|---------------------|-----------------------------|------------------|----------|
| Atmel AVR ATmega2560 100-TQFP | cycle time 10.00 ms | processor clock 16.0000 MHz | | |

El programa de (lader) lo convierte en language (C)

LDmicro - Program Editor - C:\Users\hdiaz\Desktop\arduino\plc\tanques\hdproject\tanques\hdfinal\tanque.ld

File Edit Settings Instruction Simulate Compile Help

1 ; Hector M. Diaz tank controller:temperature and level.

2 R_osc TOSC_on T_osc_off R_osc
---]/[---[TON 100.0 ms]---[TOF 100.0 ms]---()
Ccnt
[CTC 0:1]

3 ; Prepare variable

4 R_osc AAO
[] [READ ADC]

5 [AA0 >] Rlow1
[500] ()
Yph4
()

6 ic [ic ==] [ic ==] Rlow1 {"C1\r"}
[UART RECV] [13] ['c'] [] []
Rlow1 {"C0\r"}
['x'] AA0 {"X\4\r"}
['B'] YPH3 {"B1\r"}
YPH3 {"B0\r"}
['o'] {m1 :=}
['p'] {m1 :=} MOV
{0} MOV

7 [m1 ==] YPH3
[1] (S)

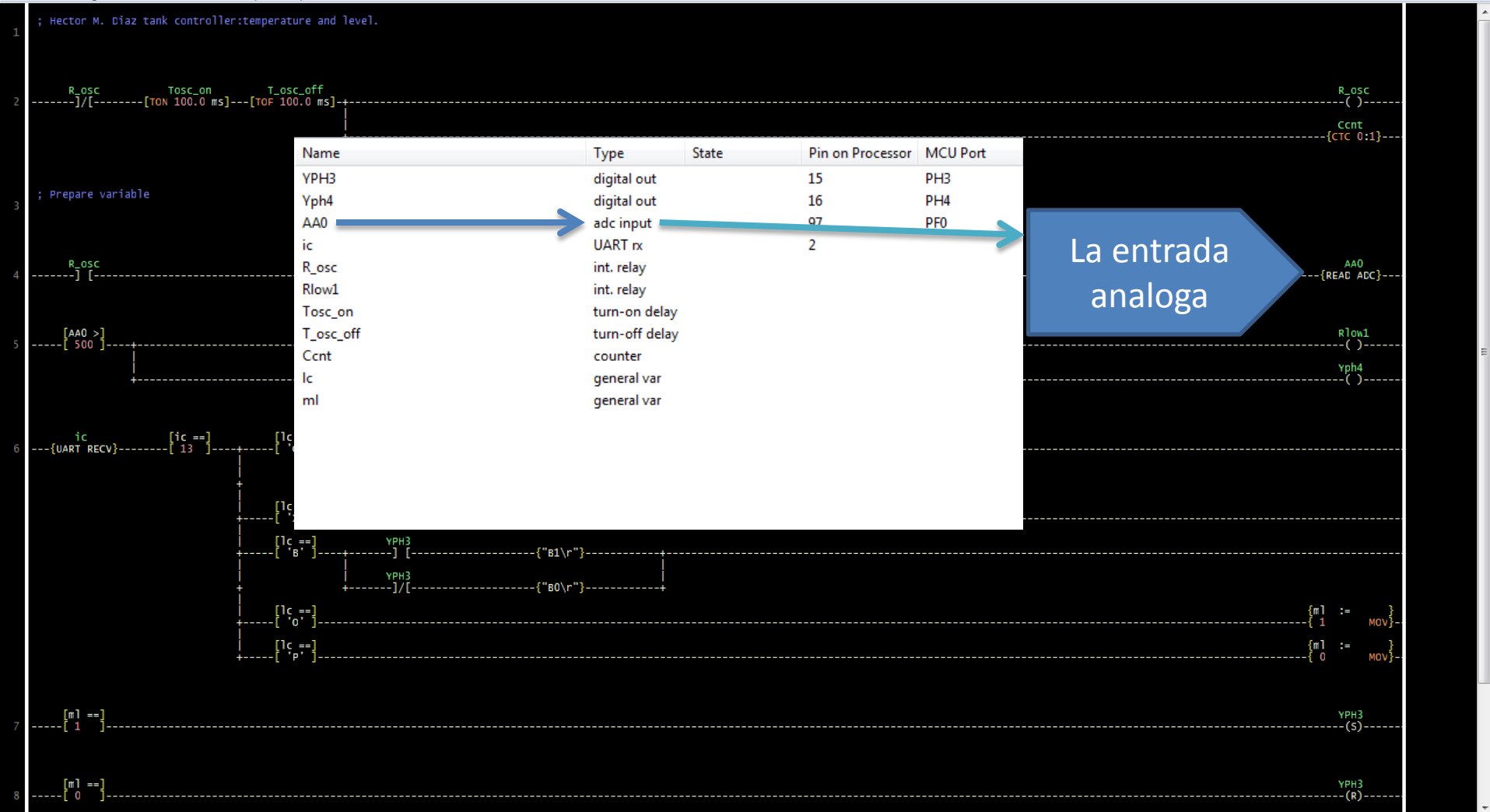
8 [m1 ==] YPH3
[0] (R)

Estos son los comando de preparacion de osilacion

| Name | Type | State | Pin on Processor | MCU Port |
|-------------------------------|------|-------|------------------|----------|
| Atmel AVR ATmega2560 100-TQFP | | | | |

cycle time 10.00 ms processor clock 16.0000 MHz

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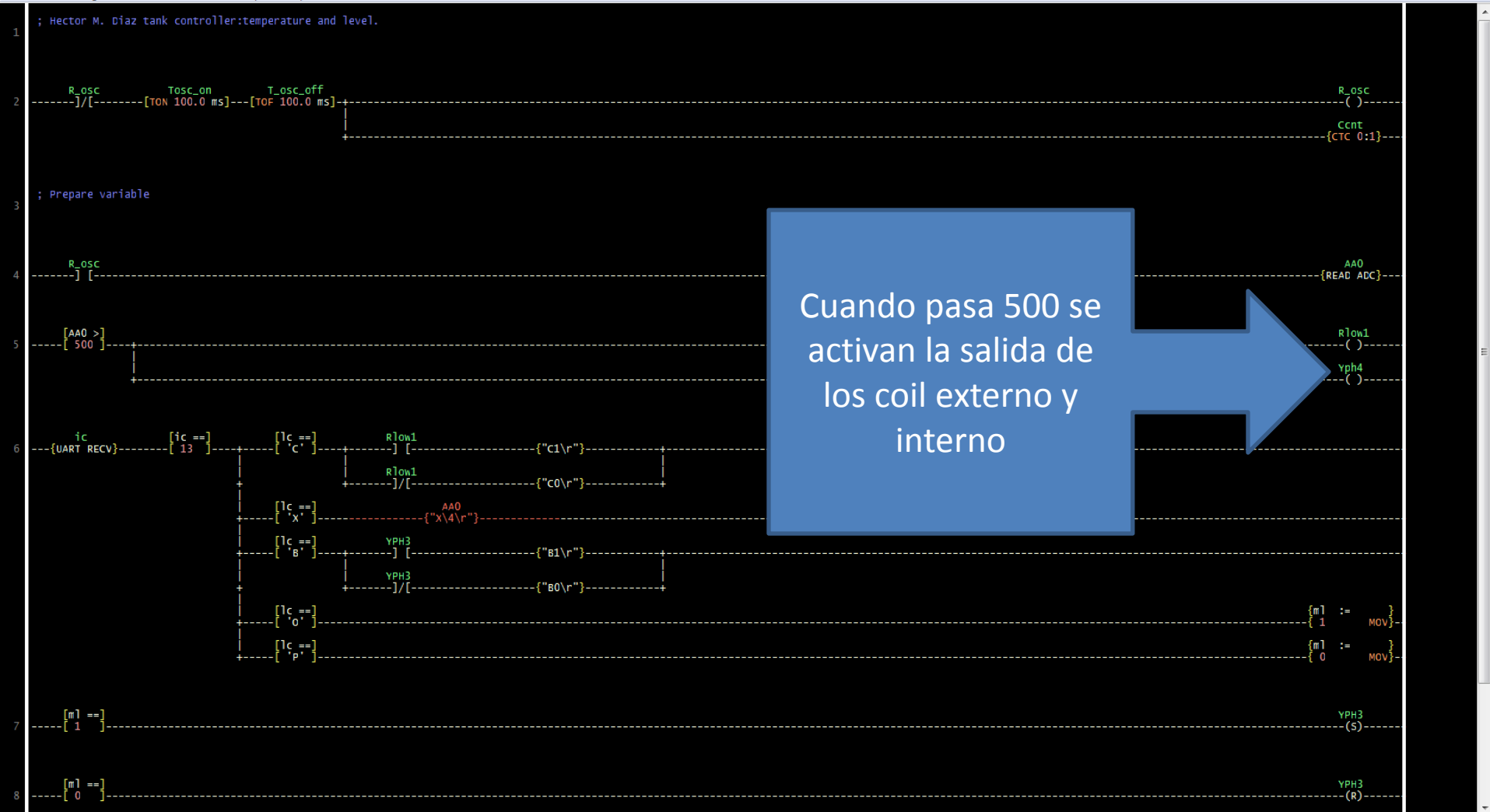
| Name | Type | State | Pin on Processor | MCU Port |
|------|------|-------|------------------|----------|
|------|------|-------|------------------|----------|

Atmel AVR ATmega2560 100-TQFP cycle time 10.00 ms processor clock 16.0000 MHz



La accion logica de la entrada analoga

| | | |
|-------------------------------|---------------------|-----------------------------|
| Atmel AVR ATmega2560 100-TQFP | cycle time 10.00 ms | processor clock 16.0000 MHz |
|-------------------------------|---------------------|-----------------------------|



Cuando pasa 500 se activan la salida de los coil externo y interno

| Name | Type | State | Pin on Processor | MCU Port |
|------|------|-------|------------------|----------|
|------|------|-------|------------------|----------|

Atmel AVR ATmega2560 100-TQFP cycle time 10.00 ms processor clock 16.0000 MHz



1 ; Hector M. Diaz tank controller:temperature and level.

2 R_osc TOSC_on T_osc_off R_osc
 ---]/[---[TON 100.0 ms]---[TOF 100.0 ms]---()
 ---[CTC 0:1]

3 ; Prepare variable

4 R_osc AAO
 ---[]---[READ ADC]

5 [AA0 >] Rlow1
 [500] ()
 Yph4 ()

6 {ic [ic ==] {UART RECV} [13] YPH3
 [] YPH3
 []

7 [ic ==] [ic ==] {m1 1} := {m1 0} :=
 [] [] [] []
 [] [] [] []

8 Name Visible True

time 10.00 ms processor clock 16.0000 MHz

Residuos para HMI entre PLC

PLC Configuration

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The screenshot shows a PLC program with several rungs. A blue box with the text "Los tag del plc que conectan con HMI" (The PLC tags that connect to HMI) has a large blue arrow pointing to a group of rungs. These rungs contain comparison instructions for variables like `[ic == 'C']`, `[ic == 'X']`, `[ic == 'B']`, `[ic == 'O']`, and `[ic == 'P']`. A green arrow points from the `[ic == 'C']` rung to a blue rectangular area representing the HMI interface. An orange arrow points from the `LZTag2` property window to the `LZTag2` tag in the HMI interface. Another orange arrow points from the `LedP2` property window to the `LedP2` tag in the HMI interface. The HMI interface also shows other tags like `LZTag1` connected to `SerialPort1`, `DigitalIN1`, and `Gauge1`. The background shows a ladder logic program with rungs for timer and counter logic.

Los tag del plc que conectan con HMI

The screenshot shows the 'Properties' tab of the Unity Inspector. The 'Name' property is highlighted with an orange arrow pointing to its value 'LZTag2'. A blue arrow points to the 'Value' field of the 'Remote' property.

Name LZTag2

ReadType: rtAlways

Value

ClipChild False

 Fill

| HitTest | True |
|---------|------|
| 0 | 0 |
| 1 | 0 |
| 2 | 0 |
| 3 | 0 |
| 4 | 0 |
| 5 | 0 |
| 6 | 0 |
| 7 | 0 |
| 8 | 0 |
| 9 | 0 |
| 10 | 0 |
| 11 | 0 |
| 12 | 0 |
| 13 | 0 |
| 14 | 0 |
| 15 | 0 |
| 16 | 0 |
| 17 | 0 |
| 18 | 0 |
| 19 | 0 |
| 20 | 0 |
| 21 | 0 |
| 22 | 0 |
| 23 | 0 |
| 24 | 0 |
| 25 | 0 |
| 26 | 0 |
| 27 | 0 |
| 28 | 0 |
| 29 | 0 |
| 30 | 0 |
| 31 | 0 |
| 32 | 0 |
| 33 | 0 |
| 34 | 0 |
| 35 | 0 |
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| 49 | 0 |
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| 52 | 0 |
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| 67 | 0 |
| 68 | 0 |
| 69 | 0 |
| 70 | 0 |
| 71 | 0 |
| 72 | 0 |
| 73 | 0 |
| 74 | 0 |
| 75 | 0 |
| 76 | 0 |
| 77 | 0 |
| 78 | 0 |
| 79 | 0 |
| 80 | 0 |
| 81 | 0 |
| 82 | 0 |
| 83 | 0 |
| 84 | 0 |
| 85 | 0 |
| 86 | 0 |
| 87 | 0 |
| 88 | 0 |
| 89 | 0 |
| 90 | 0 |
| 91 | 0 |
| 92 | 0 |
| 93 | 0 |
| 94 | 0 |
| 95 | 0 |
| 96 | 0 |
| 97 | 0 |
| 98 | 0 |
| 99 | 0 |

bs Margins <TBo

OffPath <

 OnPath

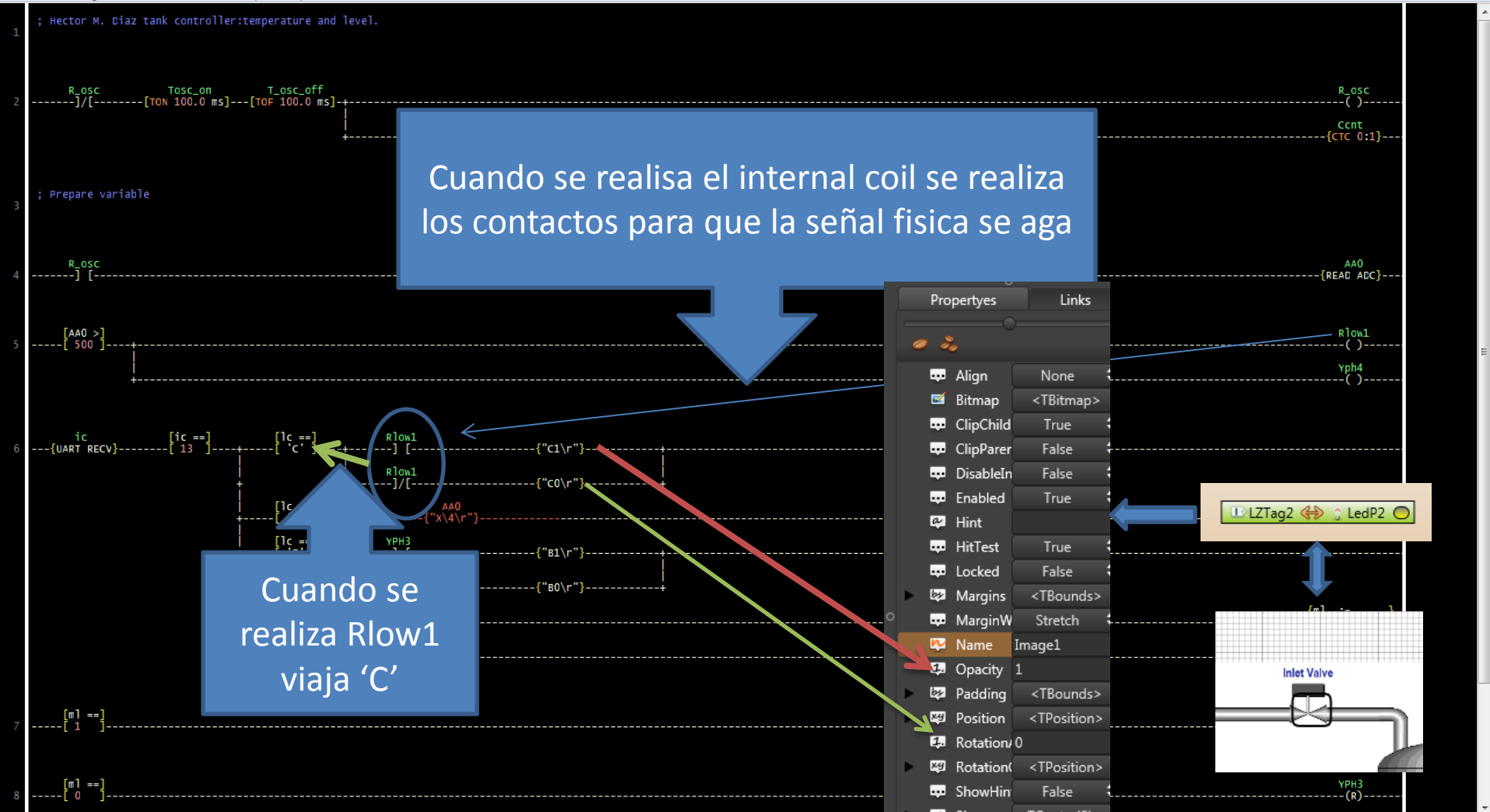
1. Opacity 1

Size <TCont

 Value

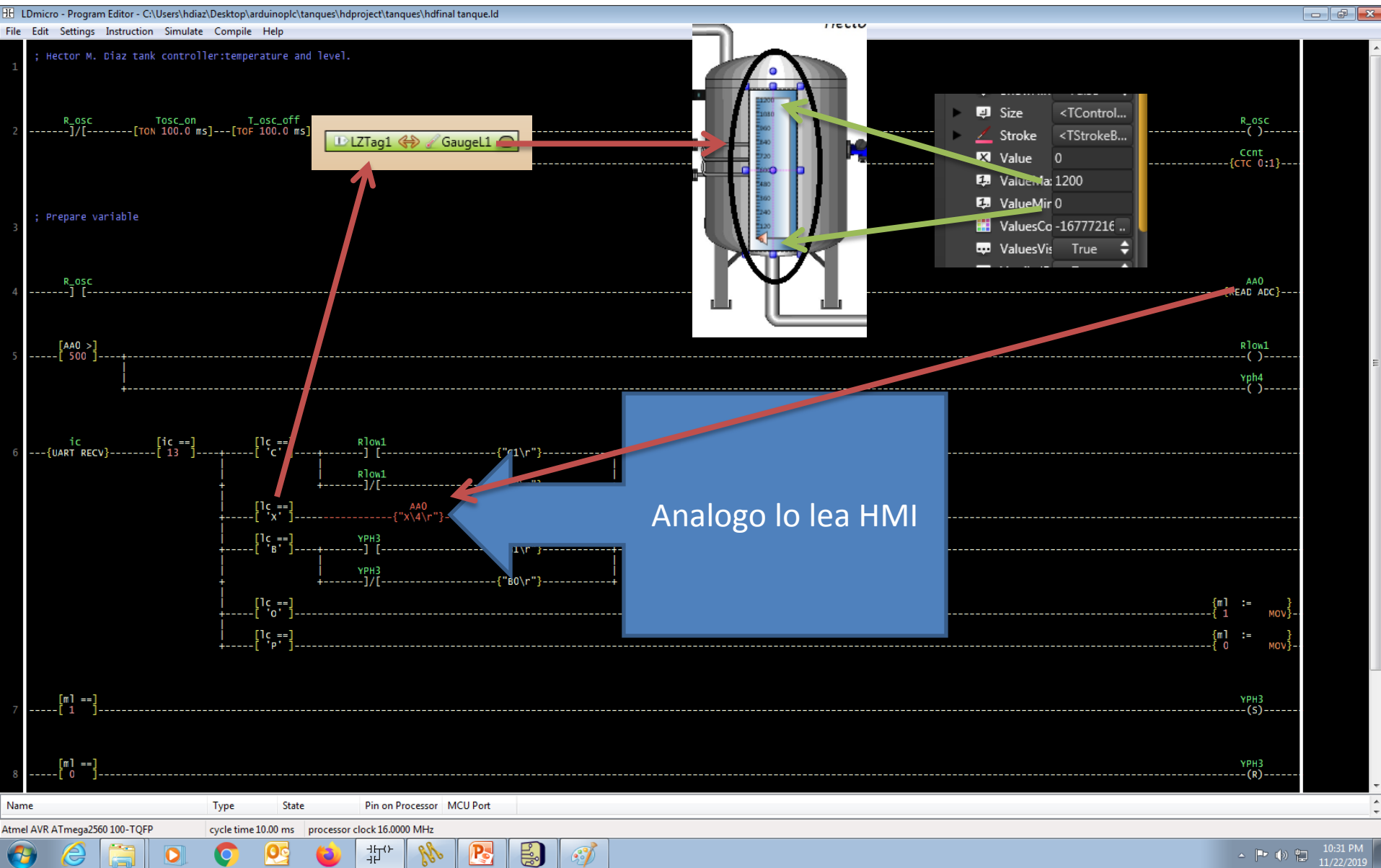


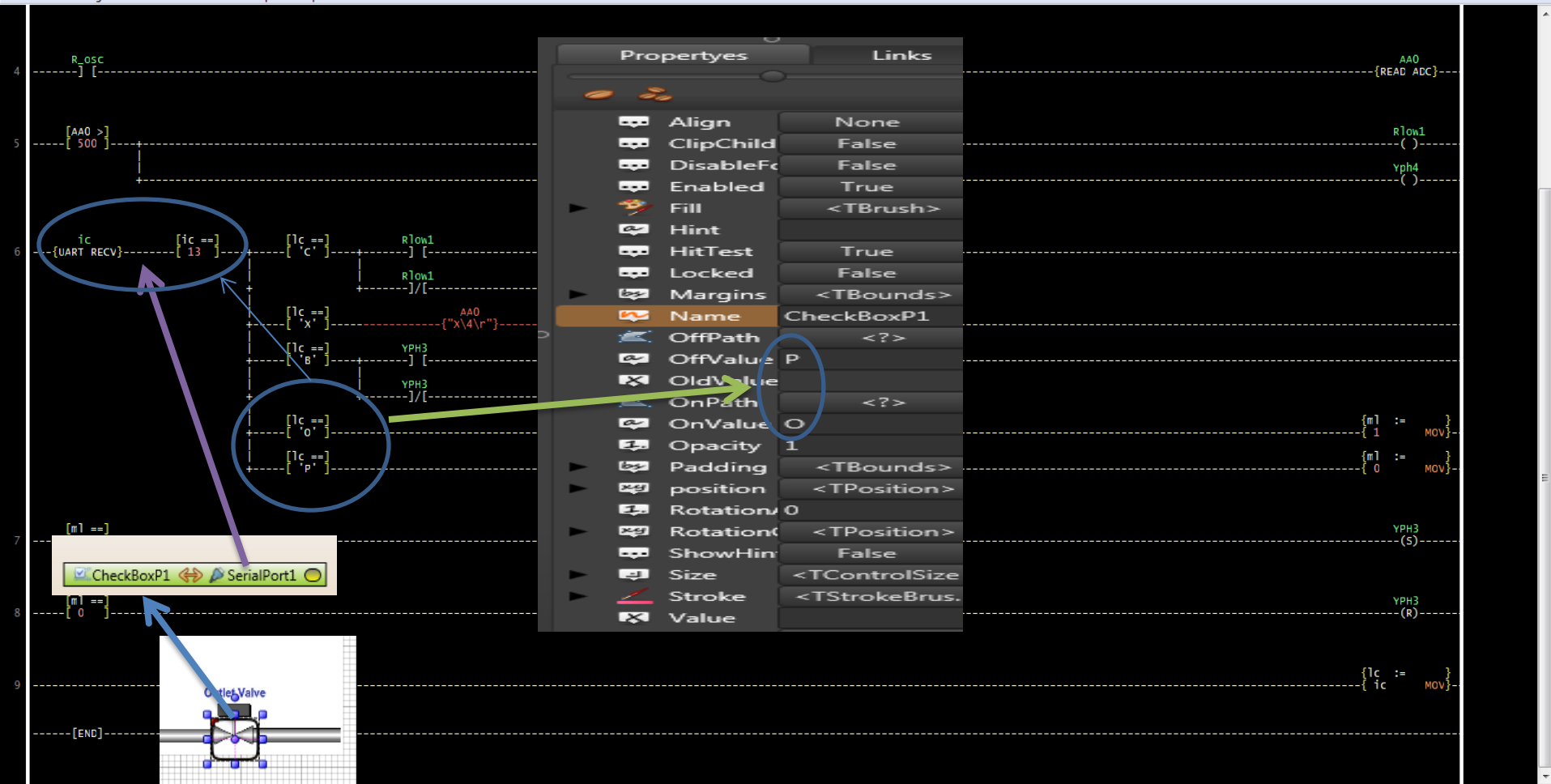
PLC Program for Tank Heating Control using Heater
Hector M. Diaz



Cuando se realiza el internal coil se realiza los contactos para que la señal fisica se aga

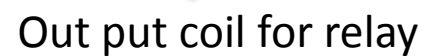
Cuando se realiza Rlow1 viaja 'C'

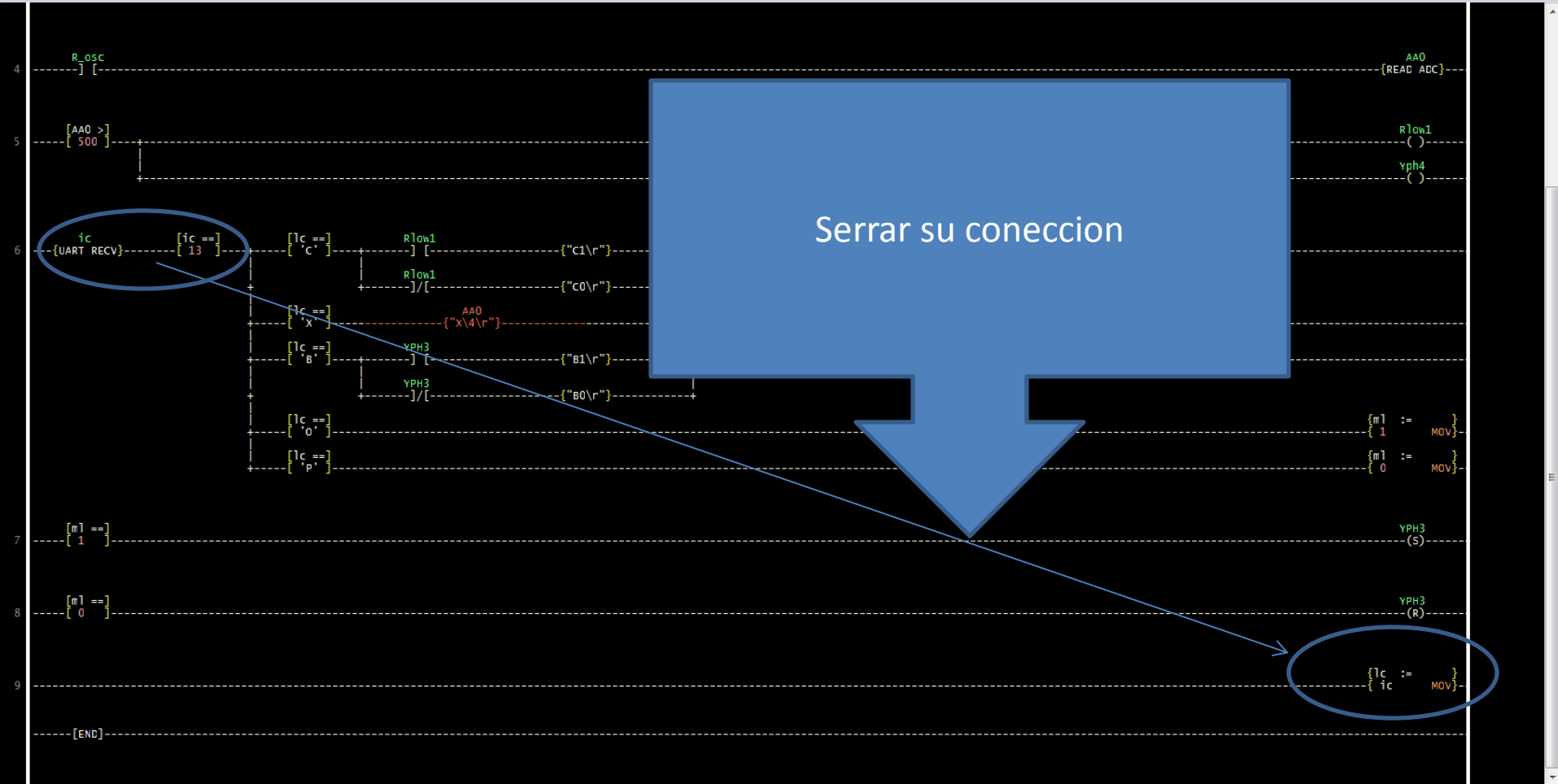




| Name | | Pin on Processor | MCU Port |
|------|-------------|------------------|----------|
| YPH3 | digital out | 15 | PH3 |
| Yph4 | digital out | 16 | PH4 |
| AA0 | adc input | 97 | PF0 |
| ic | UART rx | 2 | |

Atmel AVR ATmega2560 100-TQFP cycle time 10.00 ms processor clock 16.0000 MHz





| Name | Type | State | Pin on Processor | MCU Port |
|------|-------------|-------|------------------|----------|
| YPH3 | digital out | | 15 | PH3 |
| Yph4 | digital out | | 16 | PH4 |
| AA0 | adc input | | 97 | PF0 |
| ic | UART rx | | 2 | |

Atmel AVR ATmega2560 100-TQFP cycle time 10.00 ms processor clock 16.0000 MHz

