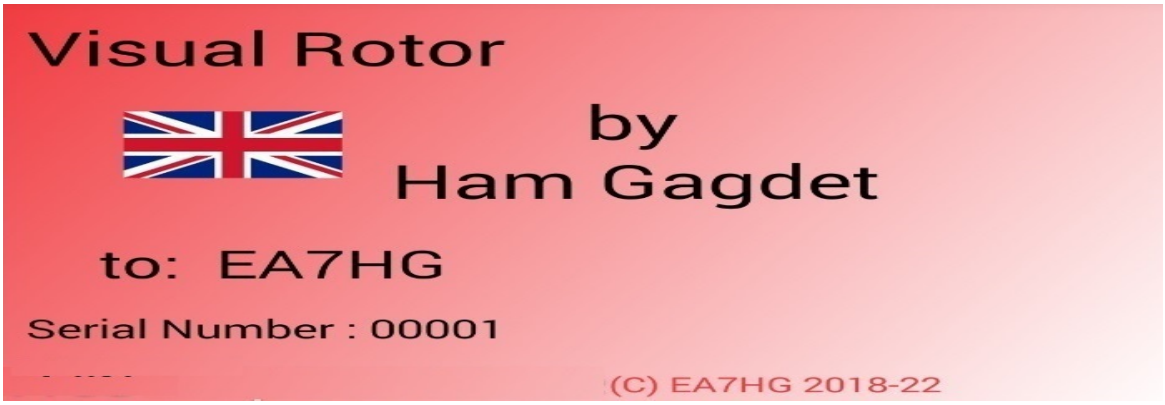
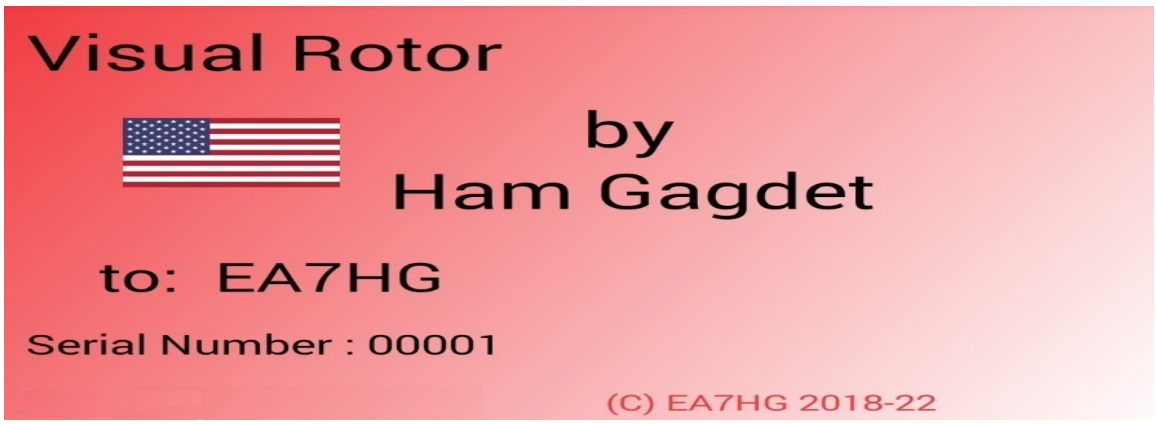
Visual Rotor V 1.62
Technical manual





Visual Rotor is a software program for Arduino Mega 2560, with TFT touch-screen of 4.3“ WQVGA with a resolution of 480*272 pixels and MicroSD memory card or Android device, that allows to handle almost any rotor that exists in the market in an easy and intuitive way ,adding some functions such as communication port RS232 serial/USB or LAN, supporting the protocol of Prosistel so it can be supported by a PC, **voice function for blind- or visually impaired people, change of direction from the screen, start / stop ramp, etc. Visual Rotor is fully updatable by software and has been developed in 6 languages: Spanish, English, French, German, Italian and Portuguese. It allows the use of up to four rotors, being able to define all the parameters according to the rotor model used. You can choose between Azimuthh and Elevation , If you want to start and stop smoothly, if the rotor allows rotation of more than 360 degrees, if the center of the rotationrange is North or South, etc. It is easy to install inside the rotor control and simple to calibrate, you only need to indicate the left stop and the right stop in Azimuth or the lower stop and the upper stop in Elevation and Visual Rotor will calculate all the necessary data for its correct use . It has several presentations of data and use on the screen. Everything is configurable from the screen, without the need for a PC.

Thank you for trusting Visual Rotor

INDEX

VERY IMPORTANT

For proper Visual Rotor operation, use original Arduino, quality wires, solder the wires to the various circuits, and use a quality power supply. I recommend Mean Well RS-15-5 power supply (5V 3A).

Disclaimer: under no circumstances, I am responsible for any damage you may cause to your rotor controller or any related devices.

Due to the fact that the manufacturer's screen NewHeaven display has become obsolete, this manual will indicate both the connection of said screen and the new screen to be used (BuyDisplay). On the other hand, Visual Rotor with the new screen has its limitations that will be indicated both in this manual and in the user manual.

Important: Take all precautions to avoid static electricity discharge by wearing an ESD wrist strap, etc.

VISUAL ROTOR CONNECTION WITH TFT DISPLAY:

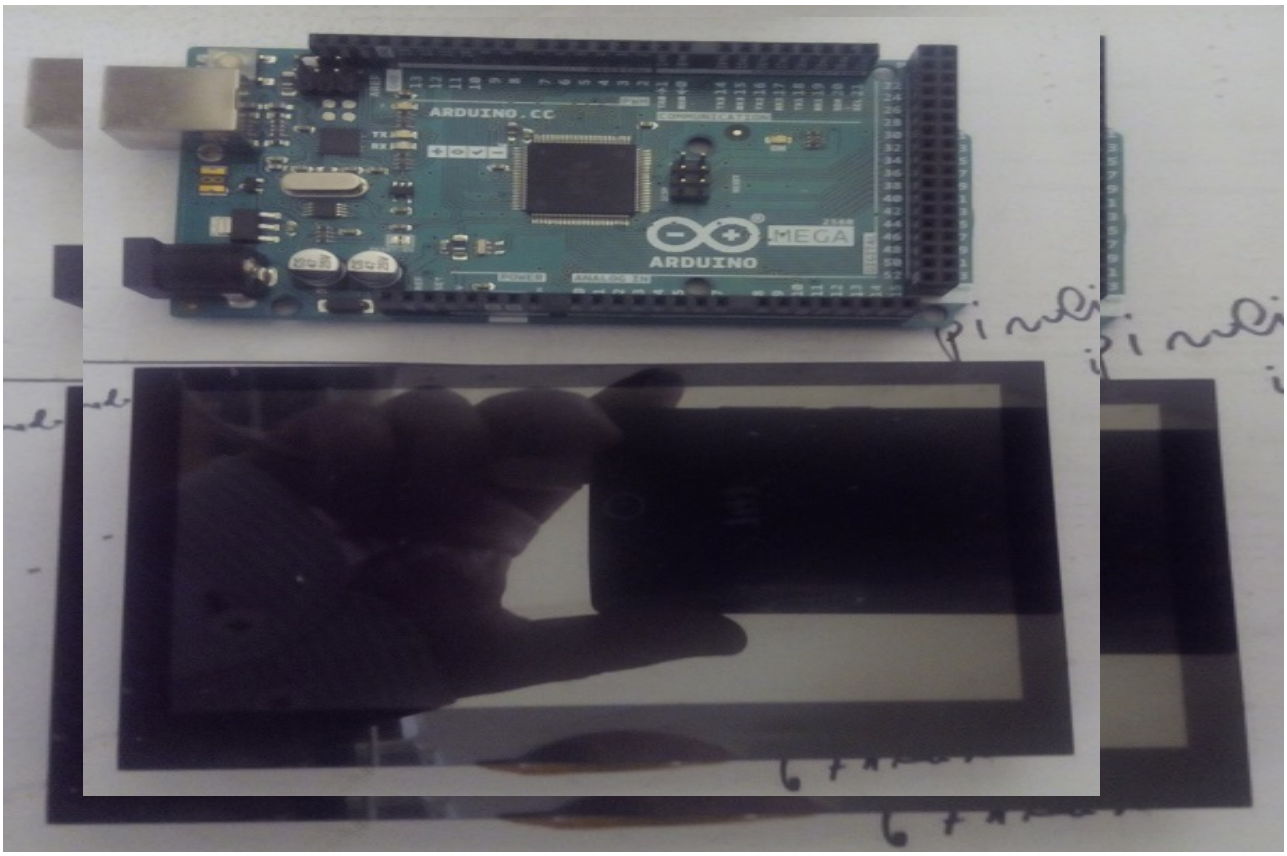
NEWHAVEN DISPLAY TFT SCREEN. (OBSOLETE)

The connection of the different parts, so that Visual Rotor works, is very easy and simple. The required hardware is stated below:

-Arduino Mega 2560 with wire to connect to the PC and to load the software.
-4.3” WQVGA TFT screen 480x272 pixel from NewHaven. (www.newhavendisplay.com) with reference **NHD-4.3CTP-SHIELD-L** (www.Mouser.com) with reference **763-NHD-43CTPSHIELDL**
(www.digikey.com) with reference **NHD-4.3CTP-SHIELD-L-ND**.
-MicroSD memory card with at least 2GB storage capacity.
-PCB with Relays (Required for some rotors).

As options:

-A small speaker of 1W 8 Ohm.
-Voltage divider according to rotor. (Made with 2 ¼ watt resistors).
-Integrated circuit MAX232 and 5 electrolytic capacitors or TTL-USB converter.
-Electronic circuit of soft start/stop of the rotor.
-Rotary encoder.
-Infrared receiver and remote control.
-Push buttons/switches for memories and parking.
- LAN interface W5100 or W5500 for Arduino.
- Arduino Joystick



Speaker: On the back of the screen there are two pads, labeled as 8 Ohm speaker, for the connection of the speaker in case you want to use it to play the voice indicating the direction and beeps when you touch on the screen.

MicroSD card: The slot for the MicroSD is located on the back of the screen.

The power connector is for supplying the Arduino with a voltage higher than 5VDC. If you already have 5VDC you can connect it to the Arduino pin marked as 5V.

The connection of the screen to the Arduino is very simple, you just have to insert the screen pins in the Arduino so that the reset button on the screen is to the right of the Arduino's power connector.

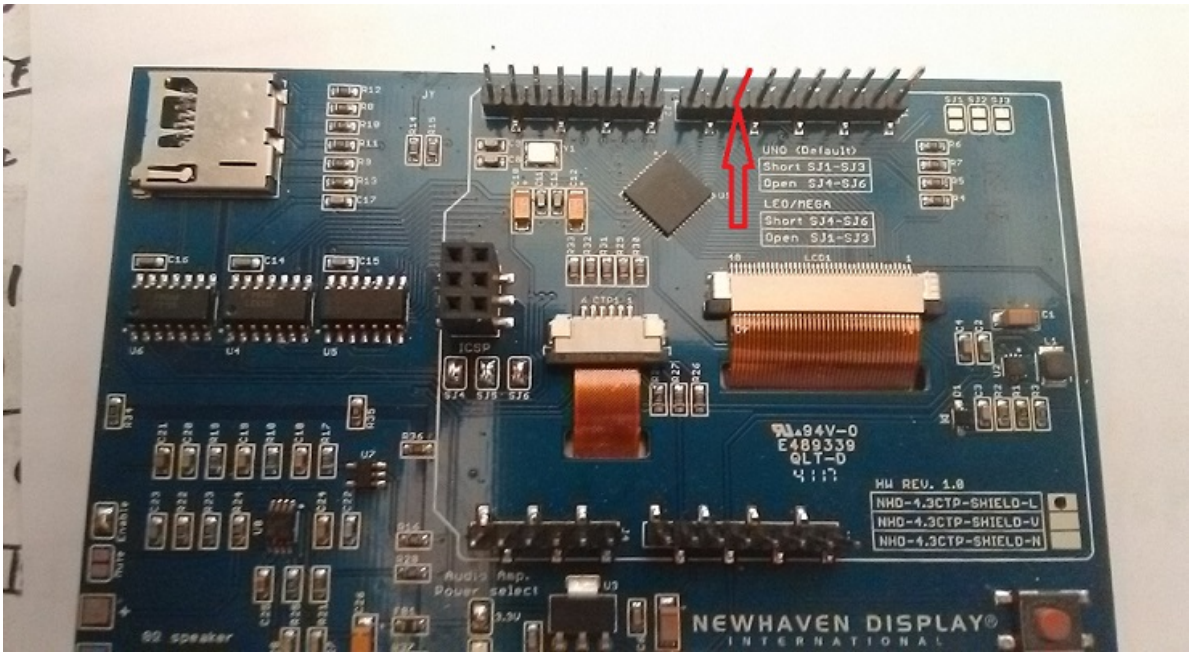
Before connecting the TFT screen shield on in the Arduino you need to store on the MicroSD card the following files:

-Visual Rotor voice files with raw extention.
-Configuration file of Visual Rotor with extention cfg.
-Language files with extention .IDI.
-File with extention JPG .
-File with extention .INI.
-User File and activation key of Visual Rotor with extention key.

Do not forget to open this file with any text program in order to have the user and the key at hand, when requested by Visual Rotor. Once copied, insert it into the MicroSD card-slot and connect the screen to the Arduino.

To install the “VisualRotor.hex” program on the Arduino, you must connect the USB wire between your PC and Arduino and use any of the two programs indicated user's manual (SOFTWARE PACKAGE AND INSTALLATION).

MODIFICATION ON THE ROTOR VISUAL DISPLAY FOR VERSION 1.1 AND HIGHER NEWHAVEN DISPLAY TFT SCREEN.



For Visual Rotor V.1.1 and higher to work properly, you will need to very carefully unsolder the display pin as shown in the image. It is relatively simple, just melt the plastic support that holds the pin with the soldering iron and then desolder the pin. Once this is done, solder a small diameter cable about 15 or 20 cm long on the pad. The other end of the cable will be soldered to pin 45 of the Arduino Mega 2560.

If you have Version 1.0 or 1.1 installed, it is not necessary to do a reset, but it is advisable that in all the new options you redefine the values by entering the menu and activating or deactivating all the new options.**In version 1.3 you have two reset options. Total and Partial Reset. The total reset returns Visual Rotor to the factory parameters. In the partial reset, it returns Visual Rotor to the factory parameters, except for the limits or tops of its rotors.**

If you had version 1.2 installed, before installing version 1.3, first install the 12a13.hex software on your arduino and follow the instructions on the screen.

VISUAL ROTOR CONNECTION WITH TFT SCREEN: BUYDISPLAY TFT SCREEN.

The connection of the different elements so that Visual Rotor works is very easy and simple. Is required:

-Arduino Mega 2560 or Mega Pro with cable to connect to the PC and load the software.

-4.3 inch TFT screen Buydisplay (www.buydisplay.com) with Ref https://www.buydisplay.com/4-3-inch-tft-lcd-display-capacitive-touchscreen-ra8875-controller

-MicroSD memory card.

-Plate with Relays (Necessary for some rotors).

As options:

-Voltage divider according to rotor. (Made with 2 Resistors of ¼ watt).

-Integrated Circuit MAX232 and 5 Electro Capacitors. o TTL-USB converter.

-Soft rotor Start/Stop electronic circuit.

-Rotary Encoder.

-Infrared receiver and control.

-Buttons for memories and parking.

-W5500 LAN circuit for arduino.

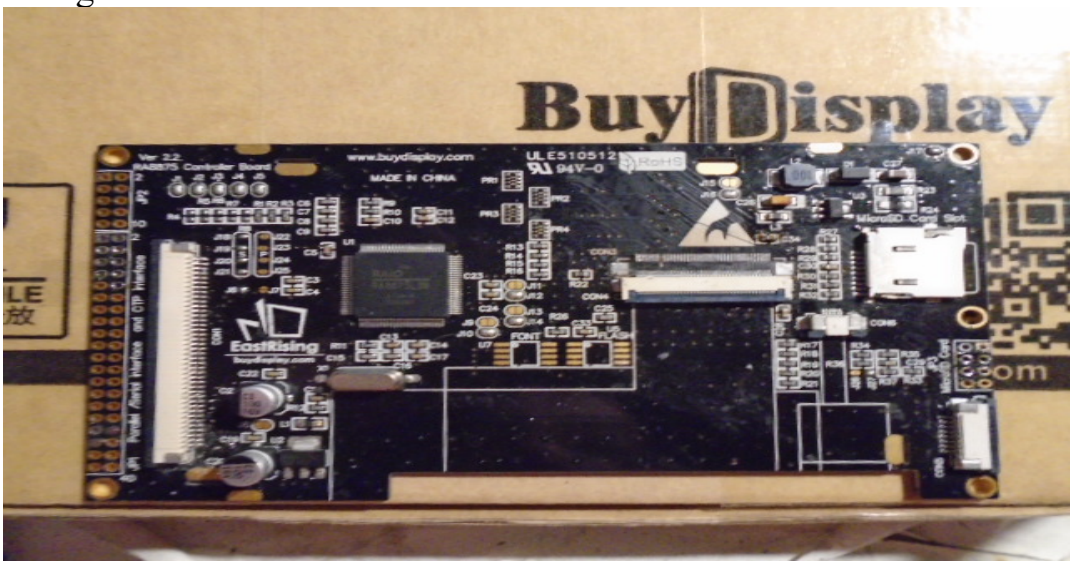
-Joystick.

-DFPlayer-Mini (MP3) + MicroSD memory card.

********** VERY IMPORTANT **********

MOUNTING ON HAM SERIES AND SIMILAR CONTROLS

You must order the screen so that it is sent without attaching to the printed circuit, since the circuit board is larger and must be assembled in two parts. To do this, contact sales@buydisplay.com beforehand so that they can give you the instructions when placing the order.

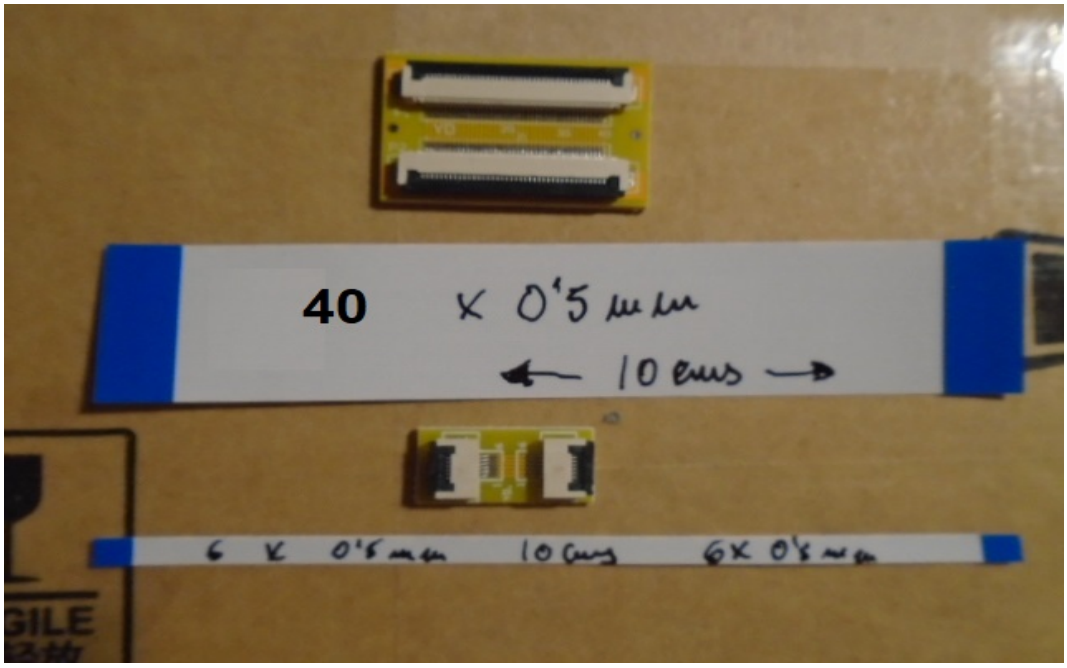


TFT screen control printed circuit

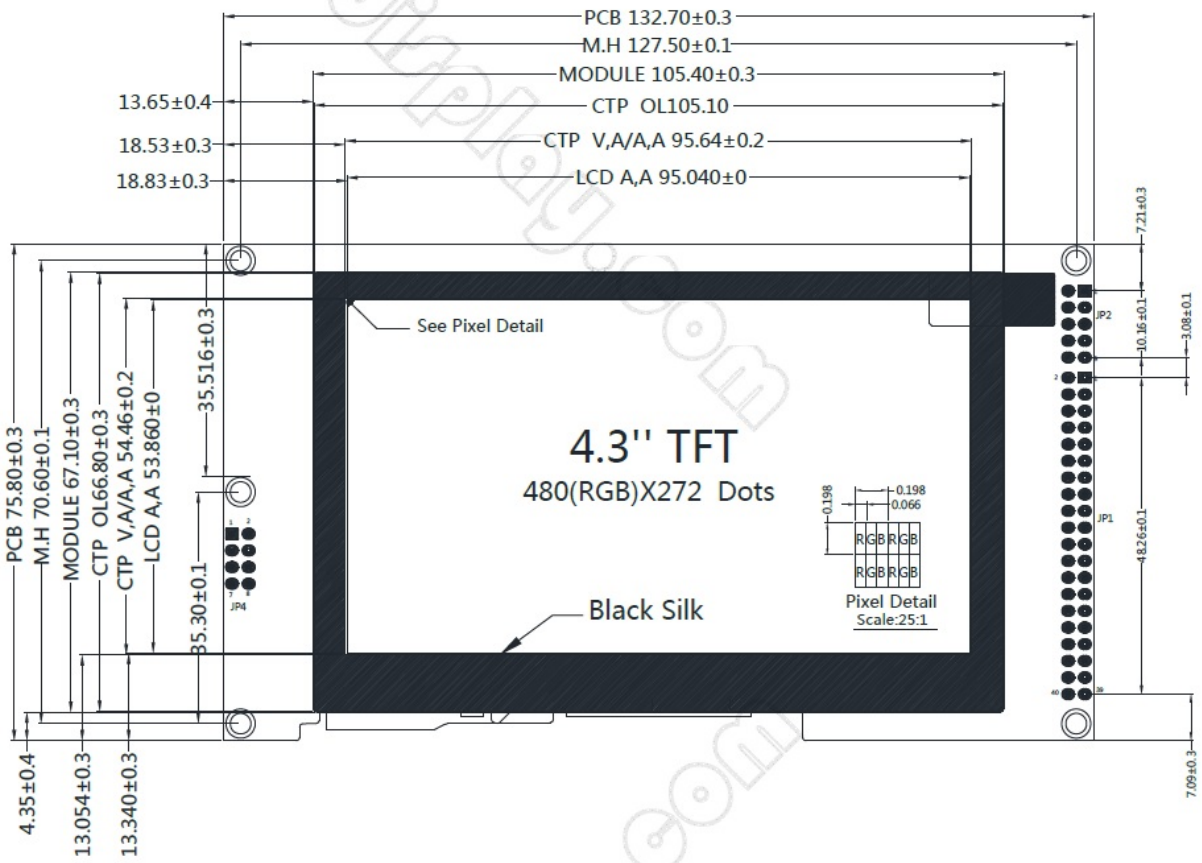
TFT screen on the side of connections to the printed circuit

You will also need the following for mounting on HAM controls...:

1 FPC/FFC flat cable **0.5 mm pitch and 40 pins**, 10 cm long. (ForwardDirection)
1 FPC/FFC flat cable **0.5 mm pitch and 6 pins** ,10 cm long. (Forward Direction)
1 FPC/FFC extension board **0.5 mm pitch and 40 pins**.
1 FPC/FFC extension board **0.5 mm pitch and 6 pins**.



MOUNTING ON OTHER CONTROLS:



Taking these measures into account, you can ask for the screen to come glued to the printed circuit.

When ordering, it allows you to select several options:
These are the necessary options for both pasted and non-pasted screen:
For detached screen, contact sales@buydisplay.com beforehand so they can tell you how to order.

4.3 inch TFT LCD Display Capacitive Touchscreen w/RA8875 Controller

ER-TFTM043A2-3_Top_View

US$50.20

Buy 10 for US$48.11 each and **save 2%**
Buy 30 for US$46.88 each and **save 5%**
Buy 50 for US$45.64 each and **save 7%**
Buy 100 for US$44.41 each and **save 10%**
Buy 500 or more **Quote Request**

Interface *

FFC Connection-4-Wire SPI +US$0.86

Power Supply (Typ.) *

VDD=5.0V

MicroSD Card Interface

-- Please Select --

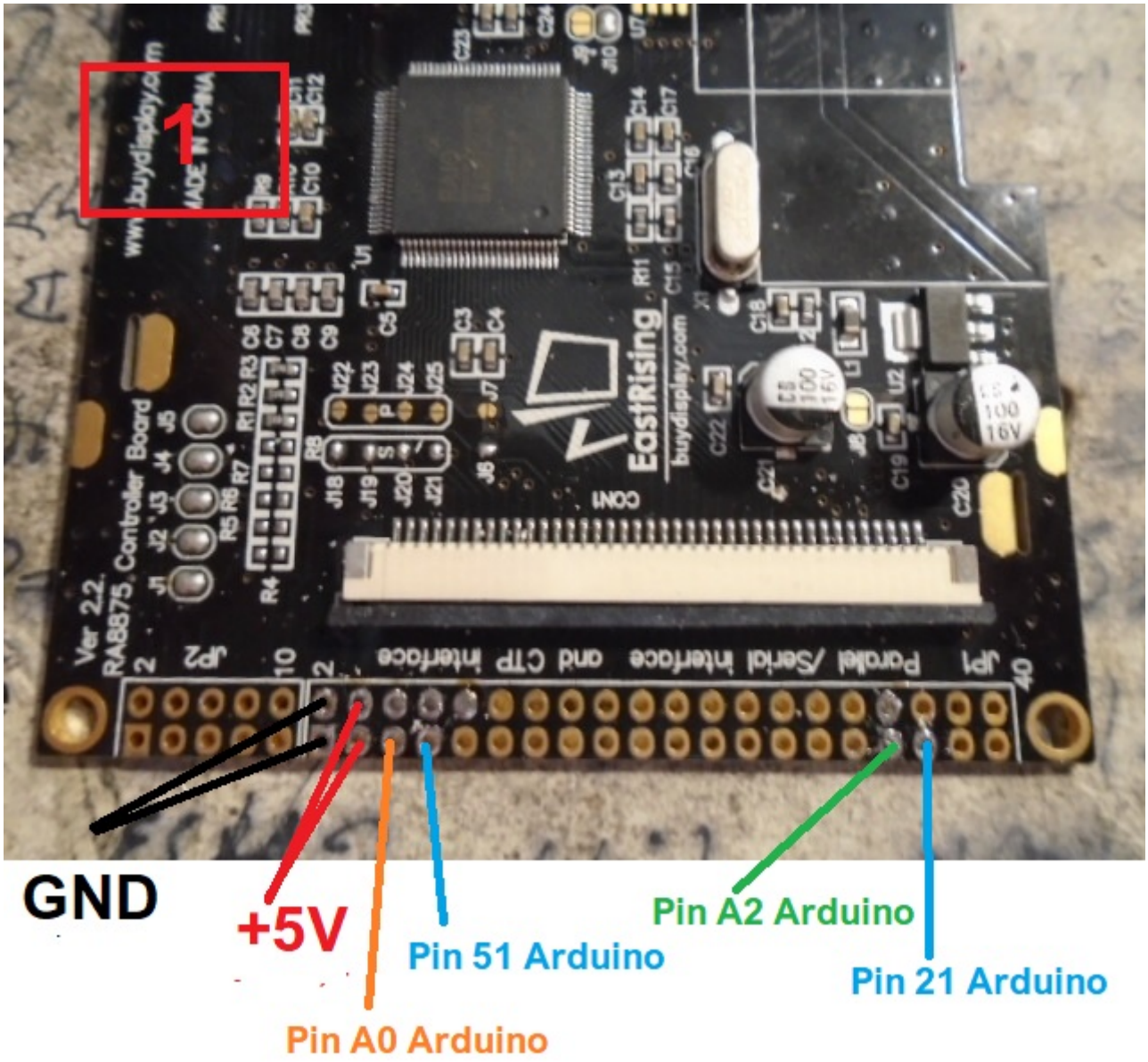
Font Chip (Refer to Doc "Summary for Font Chip")

-- Please Select --

Interface : FFC Connection 4 wire SPI
Power Supply : VDD=5.0V

BUYDISPLAY DISPLAY CONNECTION PINS:

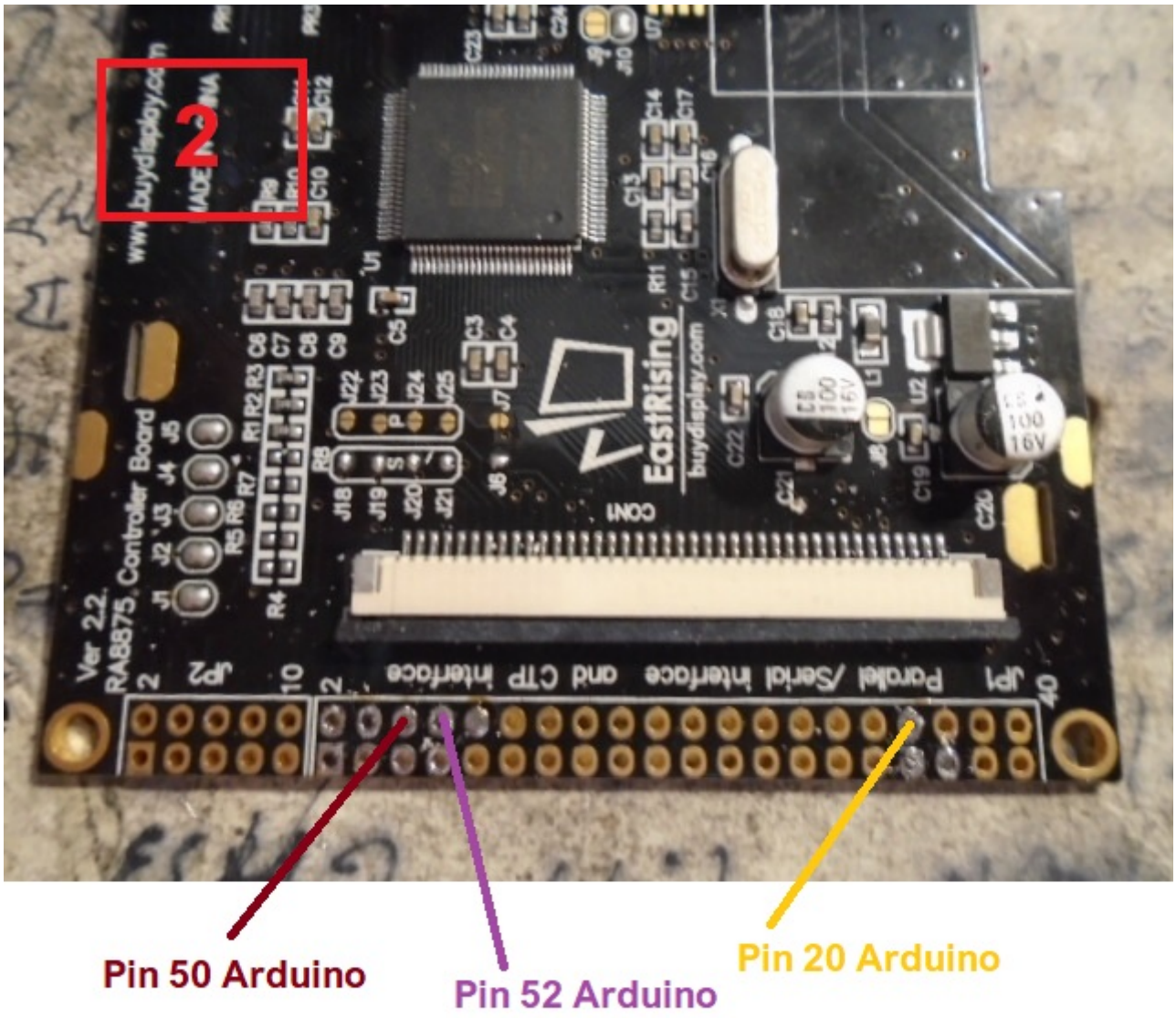
JP1 connector:



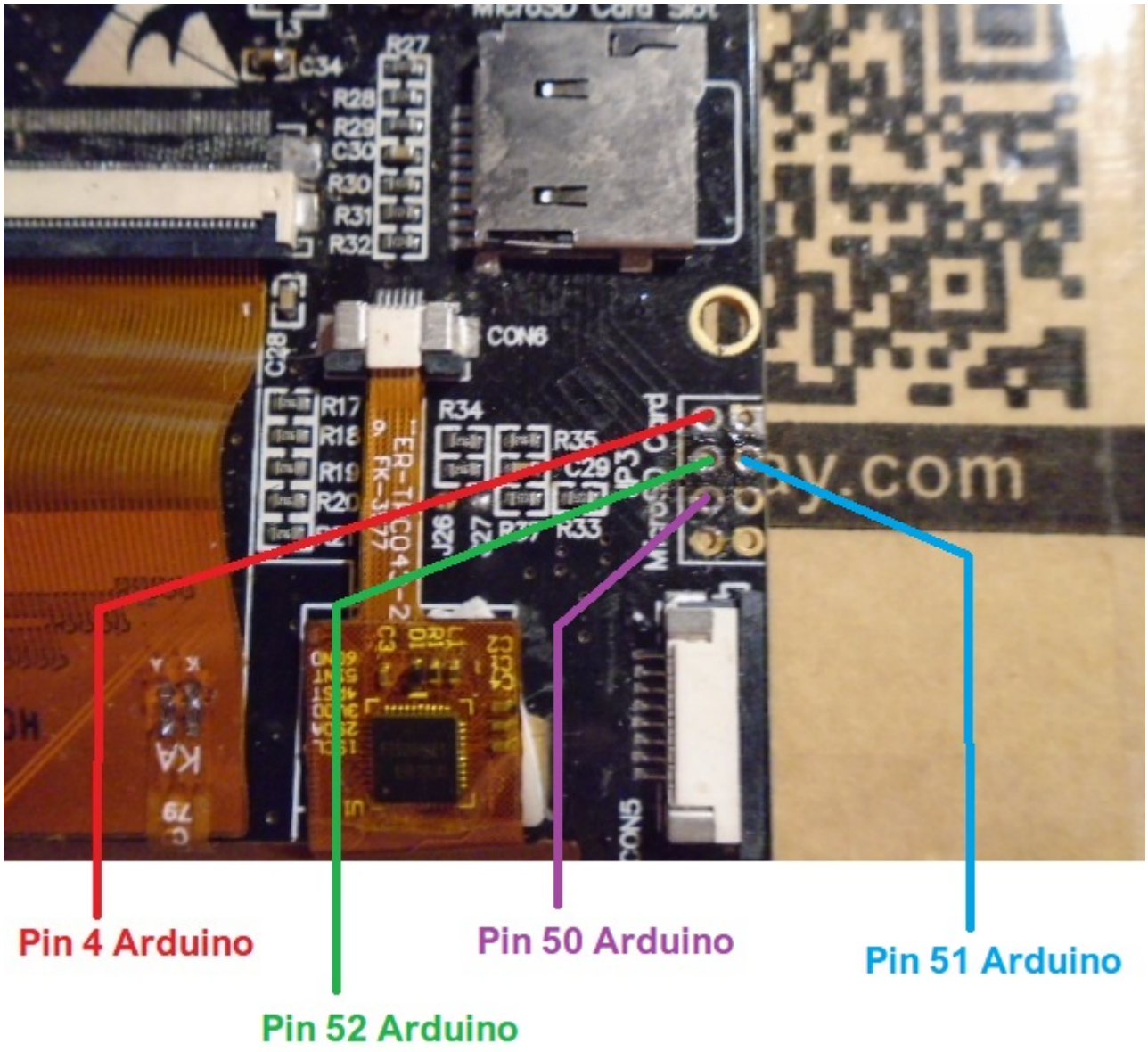
VERY IMPORTANT

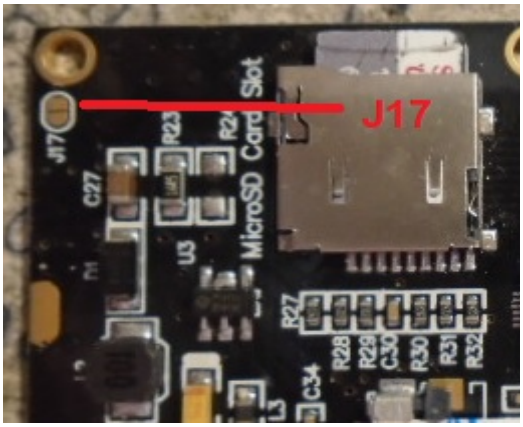
Use quality cables, as short as possible and twist them together, avoid noise in the connection lines.

JP1 connector:



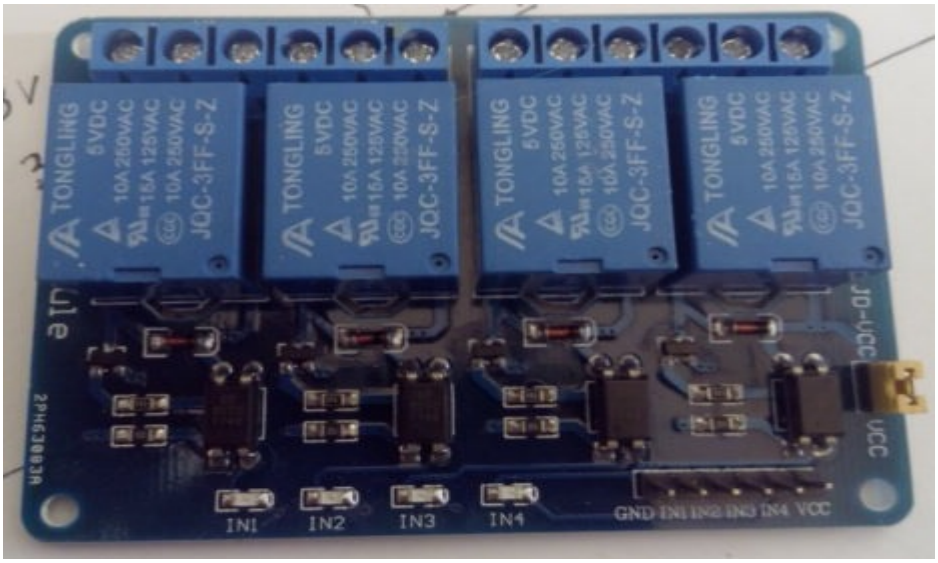
JP3 connector MicroSD Card:



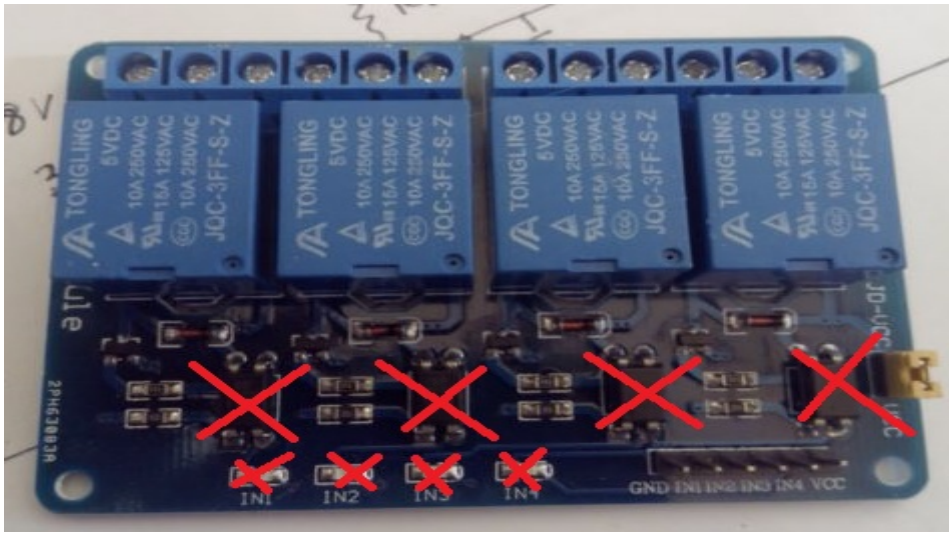


Solder to jumper J17. In this way all the fastening holes are connected to ground.

PCB with relays: In case the control of your rotor does not have relays to activate the rotation (Example Ham IV and similar) you must install a set of relays. There are relay PCBs in the market for low prices (e.g. Aliexpress, Banggood, etc).
These PCBs are valid for AC rotors that do not need to reverse the polarity to rotate the rotor motor. For DC rotors see schemes,



To use this PCB you need to do the following modifications:
Remove the 4 optocouplers and the 4 SMD LEDs.



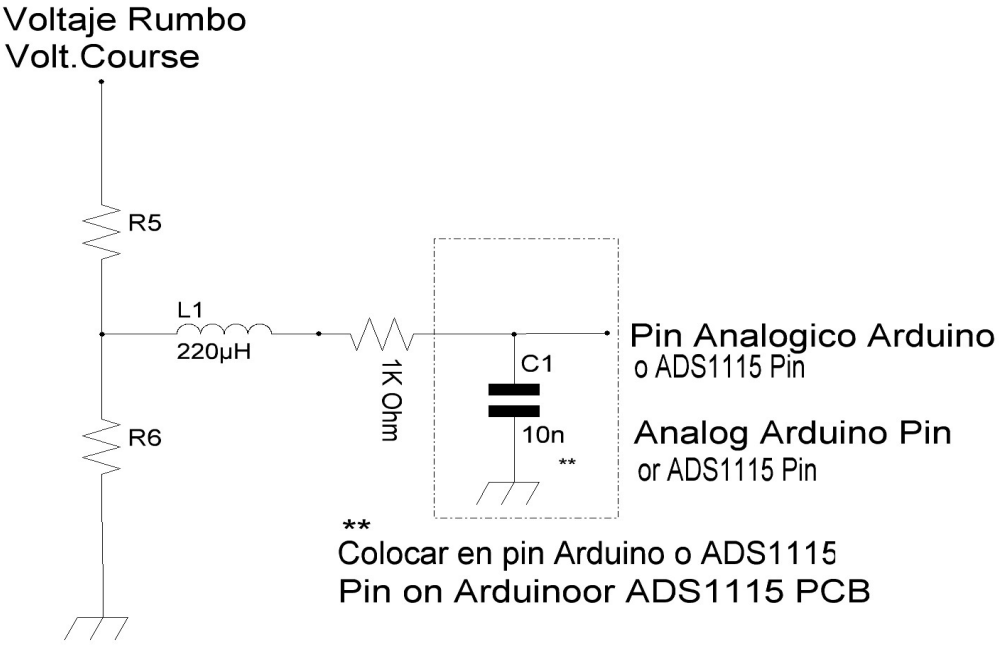
Once the indicated components have been removed, you will have to bridge the pads of the 4 SMD LEDs. You need to make the jumpers on the pads of the optocouplers and LEDs as you can see in the following image.

If for example we are going to use a Ham IV, you need at least one PCB which contains three relays, so that one relay will be for the left turn, one relay for the right turn and one relay to return / put the brake of this rotor.

The connection is very simple: The pin VCC and GND is to connect 5VDC power to the relays board. The pins IN1, IN2, etc are the number of the relays referred to.
See Arduino pin chart for Visual Rotor.

Voltage divider: Arduino is not capable of reading voltages higher than 5VDC, so if in your rotor the measured voltage on the potentiometer, which is built into the rotor, is higher than 5VDC, it is necessary to use a voltage divider to avoid damage to the Arduino.

The voltage is made with two 0,25 Watt resistors as shown in the following diagram:

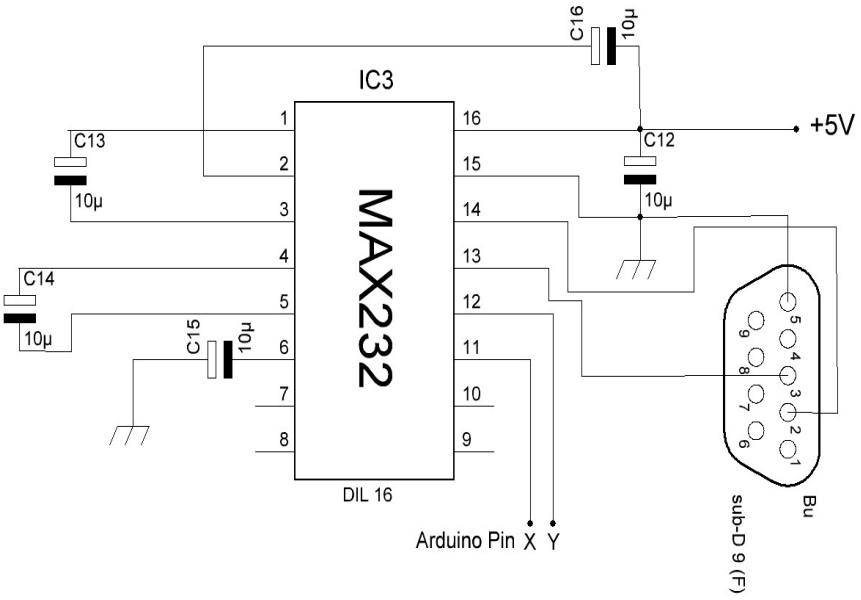


The values you can use are depending on the voltage of your rotor-potentiometer which is used to indicate the heading (Do not confuse with the working voltage of the motor).
If the voltage over the rotor-potentiometer does not exceed 5VDC, it is not necessary to use a voltage divider. Resistors are a quarter watt. You must install a ceramic 100nf capacitor between the used Arduino analog pin and the same Arduino board.

VOLTAGE HEADING	R1	R2
Voltage untill 24V	220000 Ohm	1000000 Ohm
Voltage untill 15V	470000 Ohm	1000000 Ohm
Voltage untill 10V	820000 Ohm	1000000 Ohm

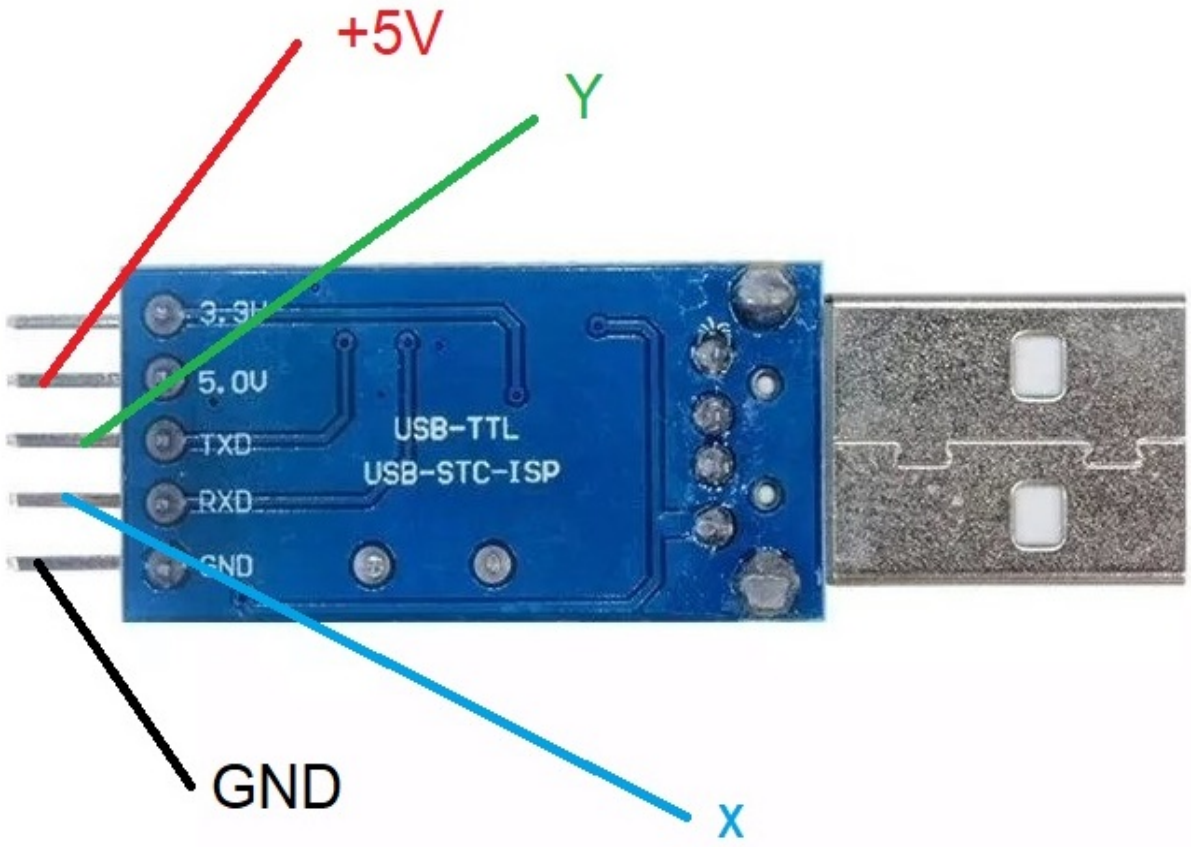
Once the divider is made, check that the voltage output does not exceed 5VDC on your voltmeter measured on the Arduino Pin of the diagram, so it will not damage your Arduino.

Circuit for RS232 (MAX232): In order for Visual Rotor to communicate with a PC, you need to add the RS232 circuit (you will need one for each rotor) described below:



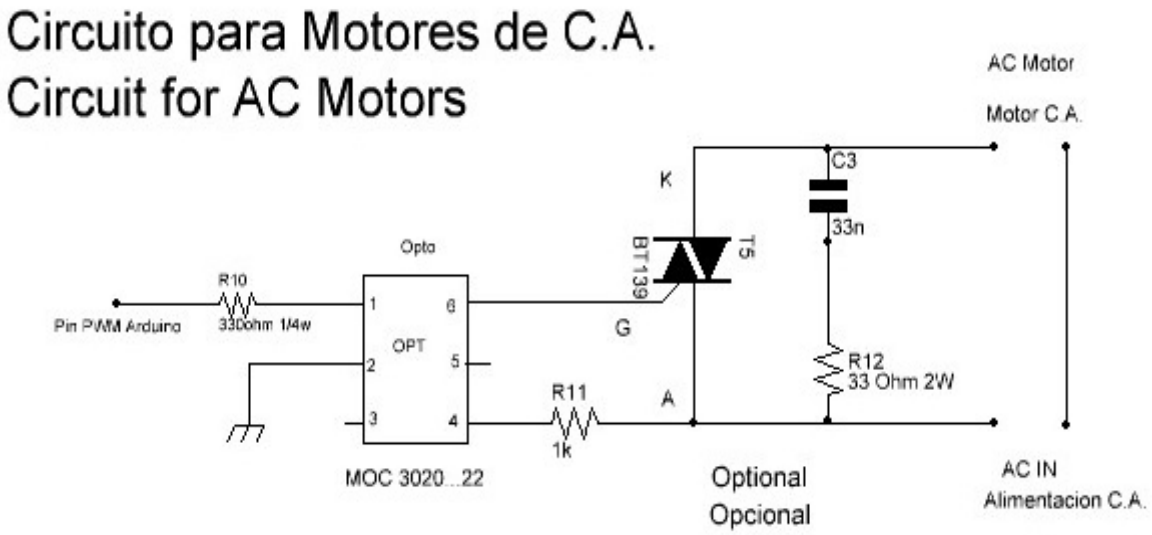
PUERTOS/PORTS	PIN ARDUINO X	Y
RS232 - ROTOR 1	1	0
RS232 - ROTOR 2	16	17
RS232 - ROTOR 3	14	15
RS232 - ROTOR 4	18	19

Circuit for USB (TTL-USB converter): In order for Visual Rotor to communicate with a PC using the USB port you need to add a TTL to USB converter. You will need one for each rotor. The connection is as follows:

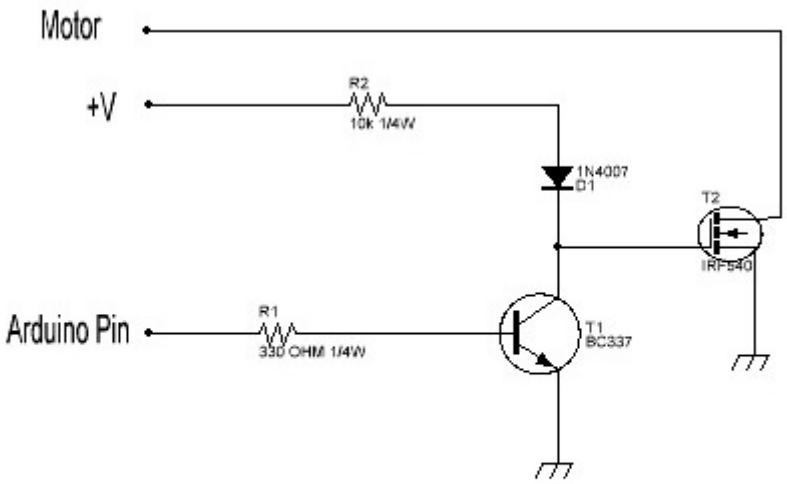


Puertos/Ports	PIN ARDUINO X	PIN ARDUINO Y
ROTOR 1	1	0
ROTOR 2	16	17
ROTOR 3	14	15
ROTOR 4	18	19

Soft rotor start/stop: In case you want the AC-rotor to have a soft start/stop, you need following circuit for AC motors. You will need one for each rotor.

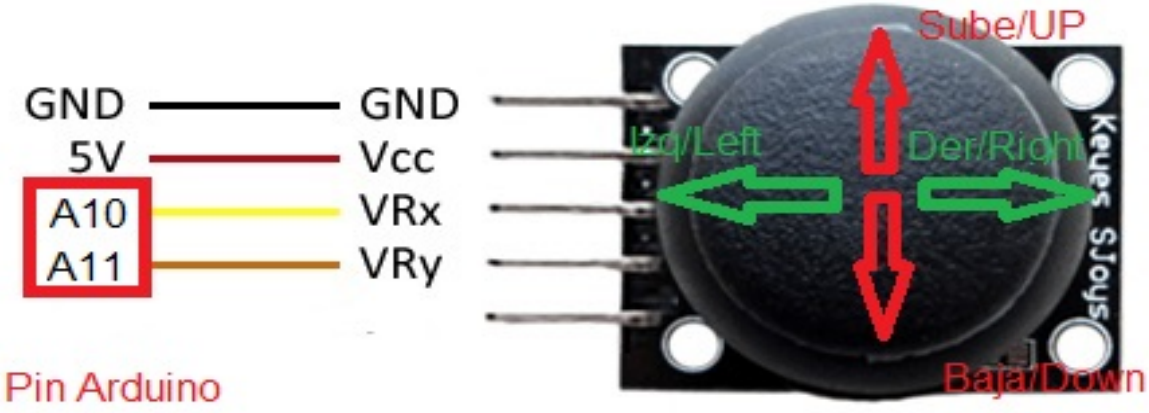


In the event that the rotor motor is DC. You will need one for each rotor and you need the following circuit:



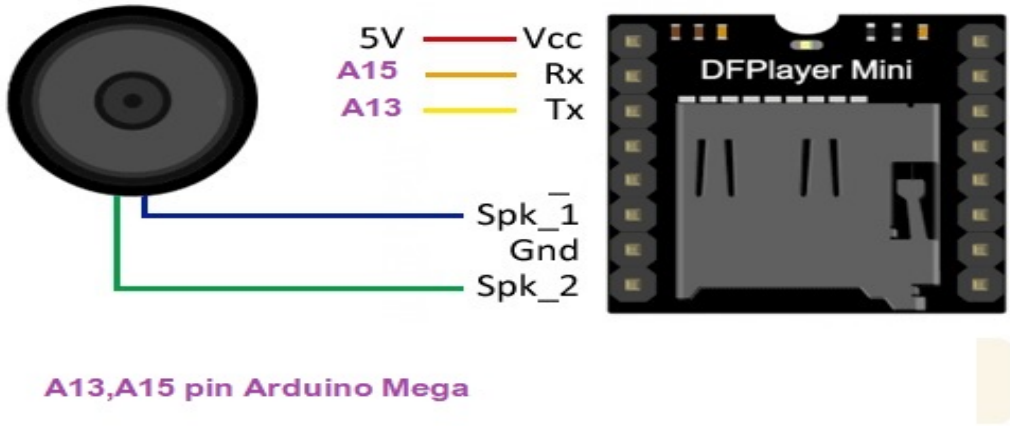
Circuito para motores C.C.
Circuit for DC motors.

Connecting Joystick: To be able to use Visual Rotor with joystick, you must connect pins VRx and VRy of the Joystick, to the pins A10 and A11of the Arduino. You must also supply the circuit with 5VDC.



The joystick works in the "Normal" mode of Visual Rotor in the following way: If the selected rotor is rotating, the joystick will only work for the left and right direction. If the selected rotor is elevating the joystick will also for work up and down.If Visual Rotor is in "x2" mode, the joystick will not work until you have chosen a rotor. Once chosen the rotor will work the same as in "Normal" mode. If Visual Rotor is in "A-E" mode, the rotating rotor will work for the left and right direction and the elevating rotor will work on up and down movement, without having a rotor chosen.

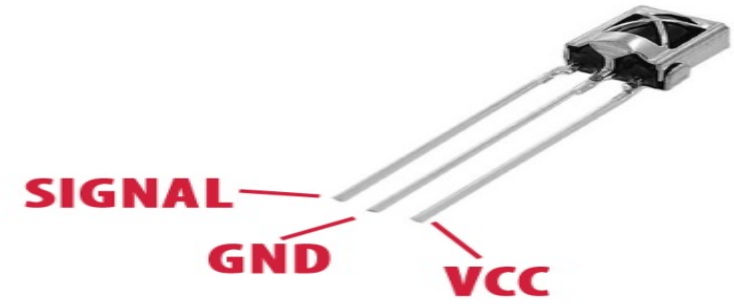
DFPlayer-MP3 connection: (Only for BUYDISPLAY screens) In order to play the sound in Visual Rotor with buydisplay screens you need to install this module. You will need to use a microSD memory card.

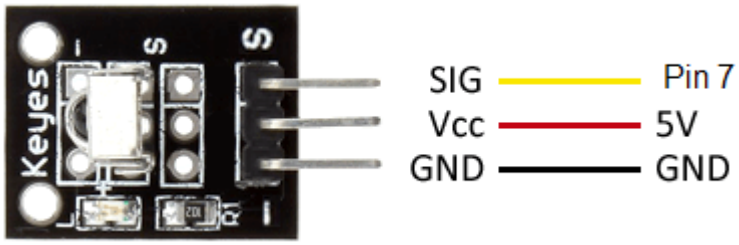


On the memory card you should only record the entire folder called MP3 supplied in Visual Rotor.

Control circuit with Infrared and command:

To be able to use Visual Rotor with infrared control, you must connect the Signal pin (SIG) to pin 7 of the Arduino. You must also supply the circuit with 5VDC. Mount the receiver in a place where you can receive the signal without obstructions.

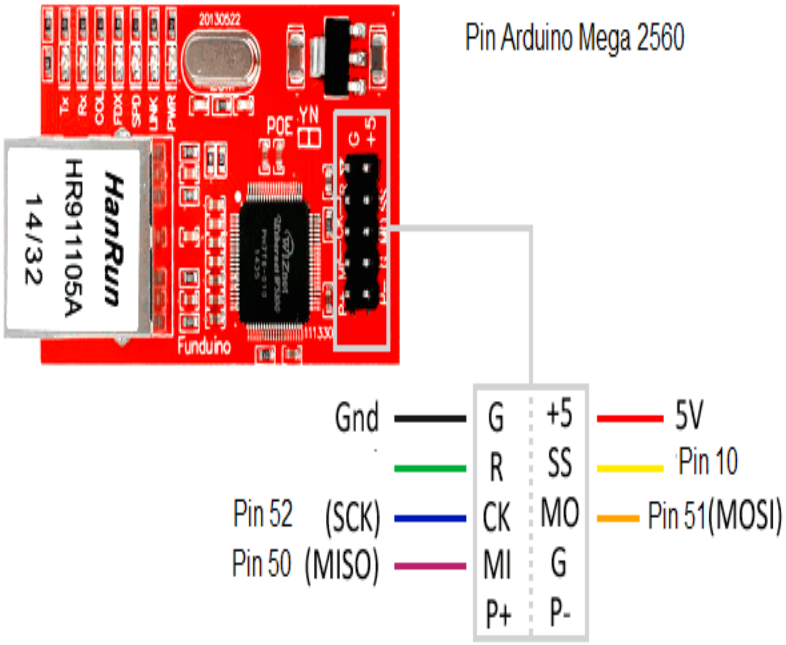




LAN circuit:

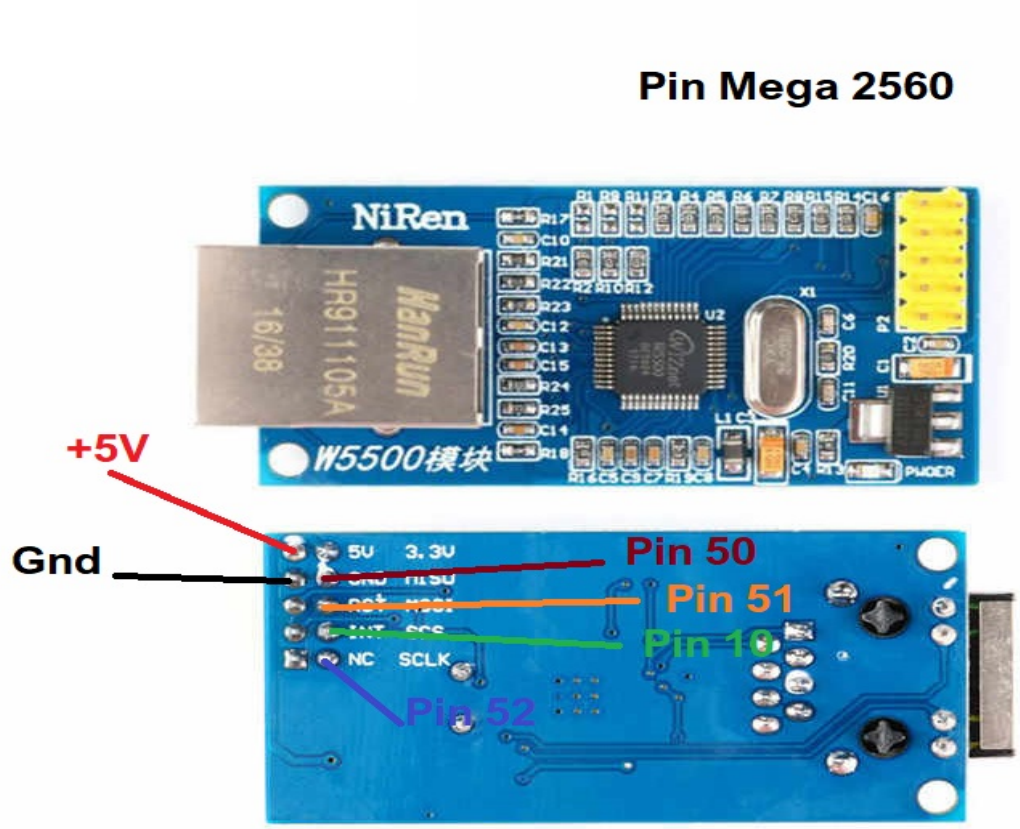
(ONLY FOR NEWHAVEN SCREENS)

To be able to use Visual Rotor from your internet browser you need to install this W5100 LAN module with SPI connection:

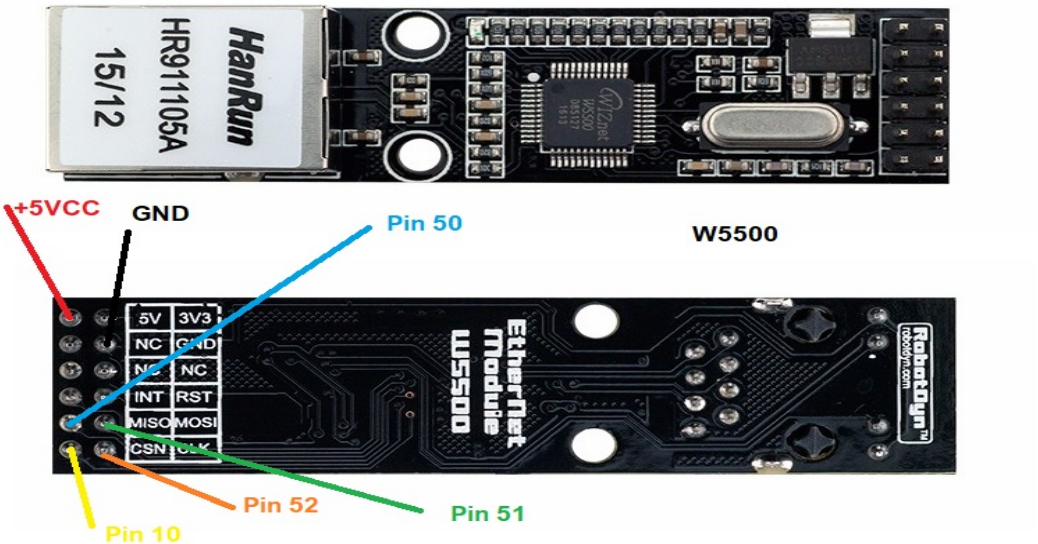


(VALID FOR NEWHAVEN AND BUYDISPLAY SCREENS)

W5500 LAN module with SPI connection:

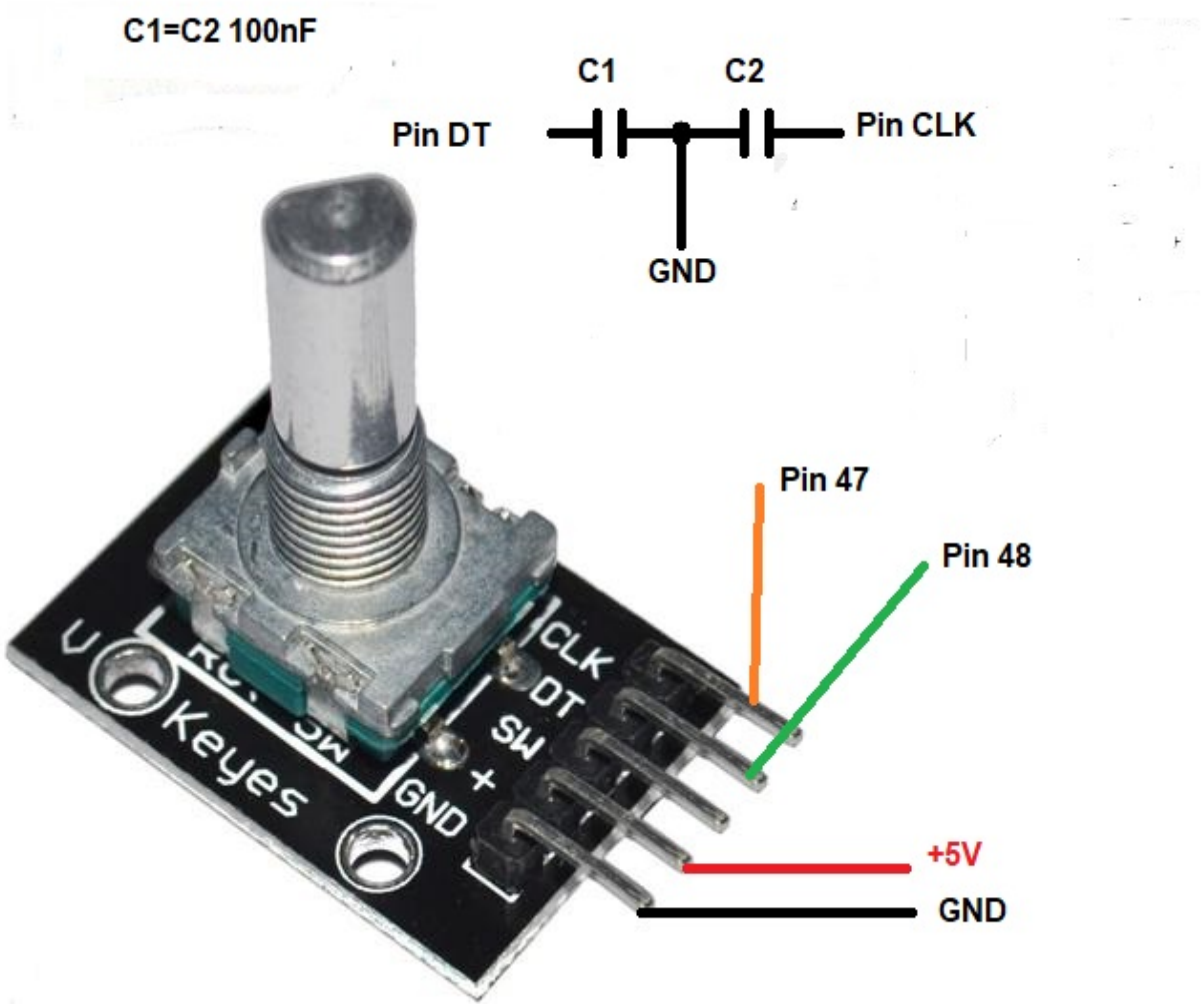


W5500 LAN module with SPI connection:



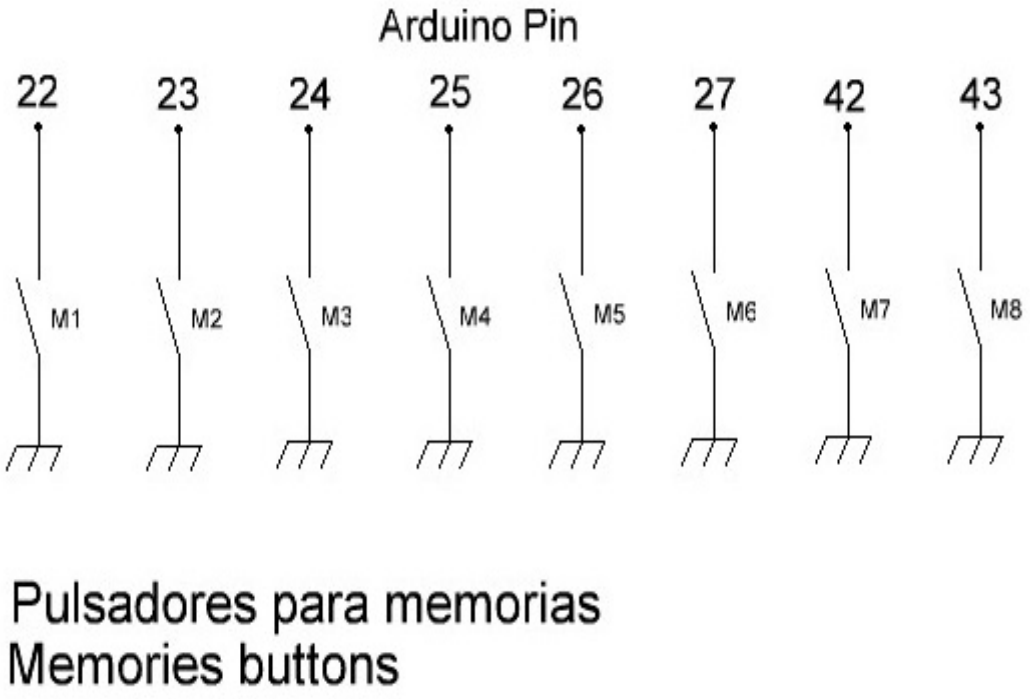
Rotary Encoder Circuit:

To be able to use Visual Rotor with an Encoder, you must install the following circuit:



The capacitors must be installed closest to the pins of the encoder. They prevent unwanted bounces when the encoder is rotated.

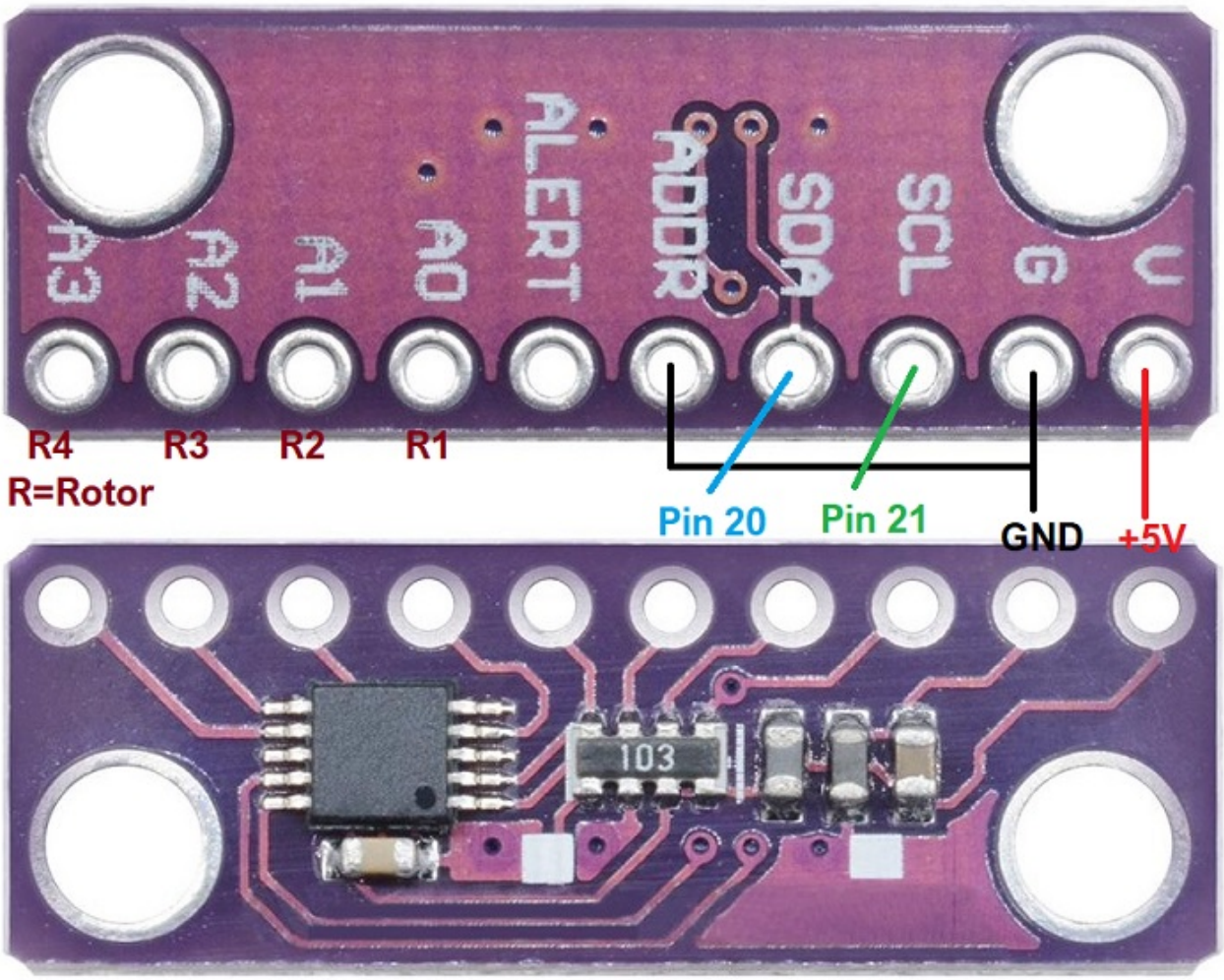
Memory pushbuttons:
Visual Rotor allows you to have 8 external buttons/switches to activate/store headings into 8 memories. The button must close the circuit when pressing this.



To change the value, stored in a memory you just need to turn the rotor to the desired heading for that memory. Once the rotor has been rotated to the chosen direction, you choose the desired memory button and keep the button pushed for 1 second until Visual Rotor confirms with three beeps and the direction will be stored. To rotate the rotor to the heading stored in the memory, you must press the button less than a second.

Analog/Digital Converter (ADC):

Visual Rotor supports the use of the ADS1115 analog/digital converter with 16-bit resolution.



Pins indicated as Pin 20 and Pin 21, refer to Pin 20 and Pin 21 of the Arduino Mega. Analog input A0 corresponds to the Heading reading voltage <=5V or Voltage Divider of rotor 1. A1 to rotor 2, A2 to rotor 3 and A3 to rotor 4.

VERY IMPORTANT
Use the voltage divider on the Page 14 in case the heading reading voltage exceeds 5V.

PIN TABLE OF VISUAL ROTOR V 1.62 IN ARDUINO:

PIN ARDUINO	ROTOR	FUNCTION
A0	ALL	Pin 5 TFT BUYDISPLAY JP1
A2	ALL	Pin 33 TFT BUYDISPLAY JP1
A6	1	Voltage reading potentiometer <= 5VDC or Voltage Divider.
A7	2	Voltage reading potentiometer <= 5VDC or Voltage Divider.
A8	3	Voltage reading potentiometer <= 5VDC or Voltage Divider.
A9	4	Voltage reading potentiometer <= 5VDC or Voltage Divider.
A10	ALL	Axis X Joystick Left /Right
A11	ALL	Axis Y Joystick UP /DOWN
A13	ALL	Pin TX MP3 (Only TFT BUYDISPLAY)
A14	ALL	Led Comunication
A15	ALL	Pin RX MP3 (Only TFT BUYDISPLAY)
0	1	TX TTL
1	1	RX TTL
2	1	PWM
3	2	PWM
4	ALL	Pin 2 TFT BUYDISPLAY JP3
5	3	PWM
6	4	PWM
7	ALL	SIG Infrared
10	ALL	LAN W5100/W5500
14	3	TX TTL
15	3	RX TTL
16	2	TX TTL
17	2	RX TTL
18	4	TX TTL
19	4	RX TTL
20	ALL	SDA module ADS1115 /Pin 34 TFT BUYDISPLAY JP1
21	ALL	SCL module ADS1115 /Pin 35 TFT BUYDISPLAY JP1
22	ALL	Memory button M1
23	ALL	Memory button M2
24	ALL	Memory button M3
25	ALL	Memory button M4
26	ALL	Memory button M5
27	ALL	Memory button M6

28	ALL	Button CW or UP
29	ALL	Button CCW or DOWN
30	4	Relay for Rotor Lock. (brake)
31	3	Relay for Rotor Lock. (brake)
32	2	Relay for Rotor Lock. (brake)
33	1	Relay for Rotor Lock. (brake)
34	1	Relay CW o UP
35	1	Relay CCW o DOWN
36	2	Relay CW o UP
37	2	Relay CCW o DOWN
38	3	Relay CW o UP
39	3	Relay CCW o DOWN
40	4	Relay CW o UP
41	4	Relay CCW o DOWN
42	ALL	Memory button M7
43	ALL	Memory button M8
45	ALL	TFT PIN 10 (Only TFT NewHaven).
47	ALL	ENCODER CLK
48	ALL	ENCODER DT
50	ALL	MISO LAN/Pin 6 TFT BUYDISPLAY JP1// Pin 6 JP3
51	ALL	MOSI LAN/Pin 7 TFT BUYDISPLAY JP1// Pin 3 JP3
52	ALL	SCK LAN/Pin 8 TFT BUYDISPLAY JP1// Pin 4 JP3

VISUAL ROTOR DEFAULT PARAMETER TABLE:

Parameter	Default value
Rotor Active	1
Name Rotor 1	Rotor 1** According to selected language
Name Rotor 2	Rotor 2** According to selected language
Name Rotor 3	Rotor 3** According to selected language
Name Rotor 4	Rotor 3** According to selected language
Type Rotor 1	Rotation
Type Rotor 2	Rotation
Type Rotor 3	Rotation
Type Rotor 4	Rotation
Ramp Rotor 1	0 Degrees (Without Ramp)
Ramp Rotor 2	0 Degrees (Without Ramp)
Ramp Rotor 3	0 Degrees (Without Ramp)
Ramp Rotor 4	0 Degrees (Without Ramp)
Rotor 1 (Overlap)	0 Degrees (Without Overlap)
Rotor 2 (Overlap)	0 Degrees (Without Overlap)
Rotor 3 (Overlap)	0 Degrees (Without Overlap)
Rotor 4 (Overlap)	0 Degrees (Without Overlap)
Start / Stop Mode Rotor 1	Normal
Start / Stop Mode Rotor 2	Normal
Start / Stop Mode Rotor 3	Normal
Start / Stop Mode Rotor 4	Normal
Right limit Rotor 1	0
Right limit Rotor 2	0
Right limit Rotor 3	0
Right limit Rotor 4	0
Left limit Rotor 1	49000
Left limit Rotor 2	49000
Left limit Rotor 3	49000
Left limit Rotor 4	49000

Parameter	**Default value**
Graphic Rotor 1	Sphere
Graphic Rotor 2	Sphere
Graphic Rotor 3	Sphere
Graphic Rotor 4	Sphere
Center Rotor 1	North
Center Rotor 2	North
Center Rotor 3	North
Center Rotor 4	North
VCC Arduino	5.00 Volts
Sound	50,00%
RS232/USB	Not activated
LAN	Not activated
Infrared	Not activated
Encoder	Not activated
Joy Stick	Not activated

EXAMPLE OF CONTROL OF HAM IV, CD45, ETC WITHOUT KIT :

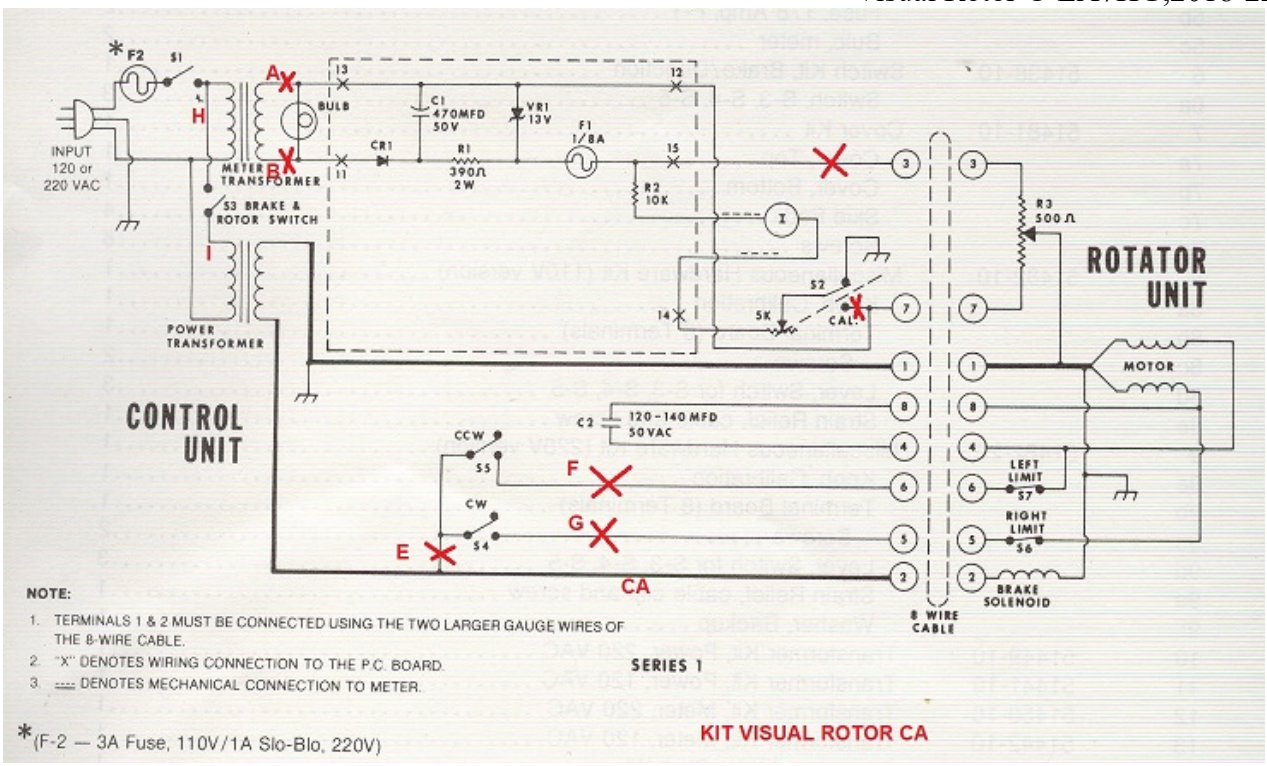
CD45, HAM II, HAM III, HAM IV, HAM V, HAM VI,HAM VII

Disclaimer: under no circumstances, I am responsible for any damage you may cause to your rotor controller or any related devices.

What do you need?

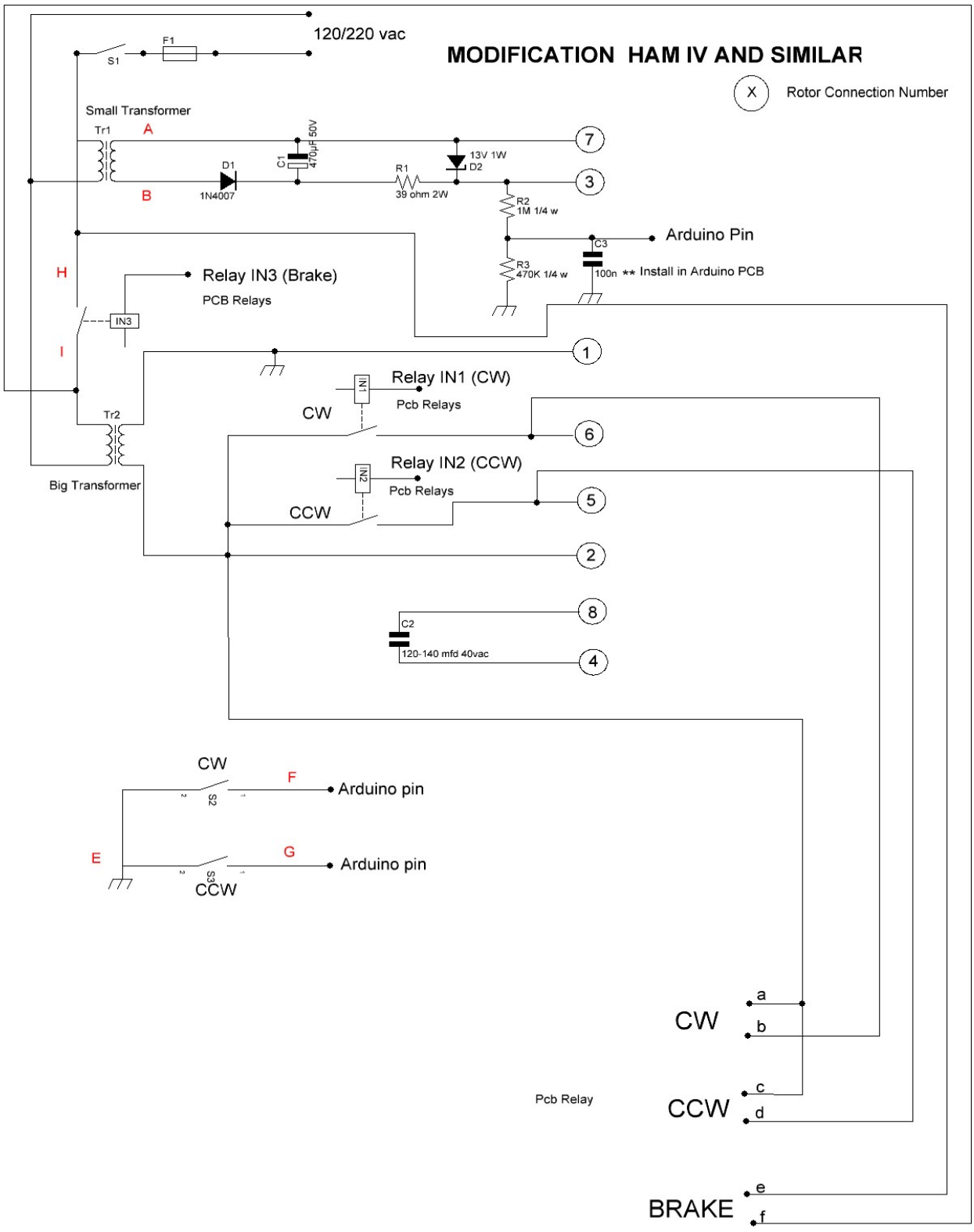
- Arduino Mega 2560
- Special Arduino Touch Screen TFT 4,3”
- MicroSD memory card (4GB or more, will do)
- Voltage divider for 15VDC.
- PCB Relays
- Power Supply 5VDC 2A for Arduino, TFT and PCB Relays
- 1 Diode 1N 4007
- 1 Diode Zener 13V 1W
- 1 Resistor 390 Ohm 2W
- 1 Capacitor 470uF 50VDC
- As an option: Speaker for voice, RS232 circuit or USB if you want to connect it to the PC.

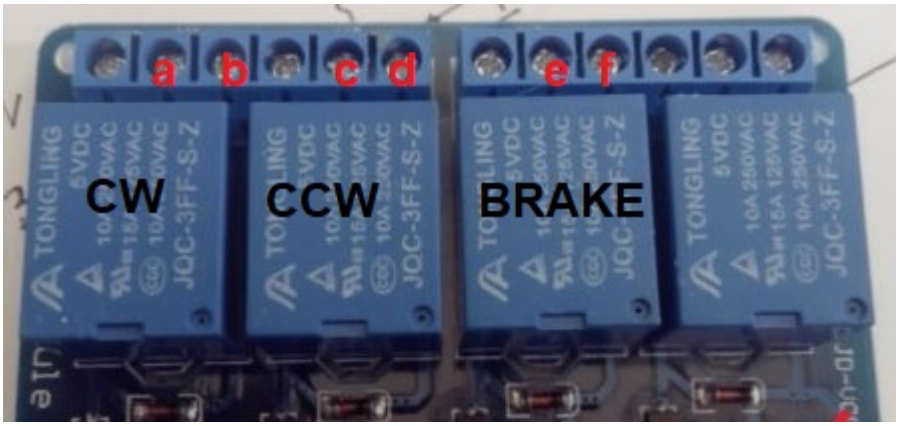
The size of the screen is the same as the measured hole by removing the bezel from the meter.
To attach the screen to the front of the control box you can use double-sided adhesive tape attached to the black frame surrounding the screen.



This is the original scheme of the rotor control. The dash-lined zone is the voltage circuit for the direction and the components are mounted on a printed circuit connected to the meter with two screws and their nuts.
Disconnect all the wiring that starts from the printed circuit connected to the meter. Do not reconnect it from the PCB but from the places where these wires are soldered, potentiometer, transformer, etc. In this way you can always make the process reversible.
The (potentiometer)voltage circuit for the direction I built on a separate PCB (to leave the original in the C of the controler) together with the circuit of RS-232 and I have installed it in the lower part of the housing together with the relay PCB.
The relay PCB are mounted with the same screws as the transformer that feeds the motor and rotor brake. Before placing the relay PCB it is advisable to make sure the wires are long enough to reach the front of the control on pins marked as VCC, GNC, IN1, IN2 and IN3 and then connect them to the Arduino.

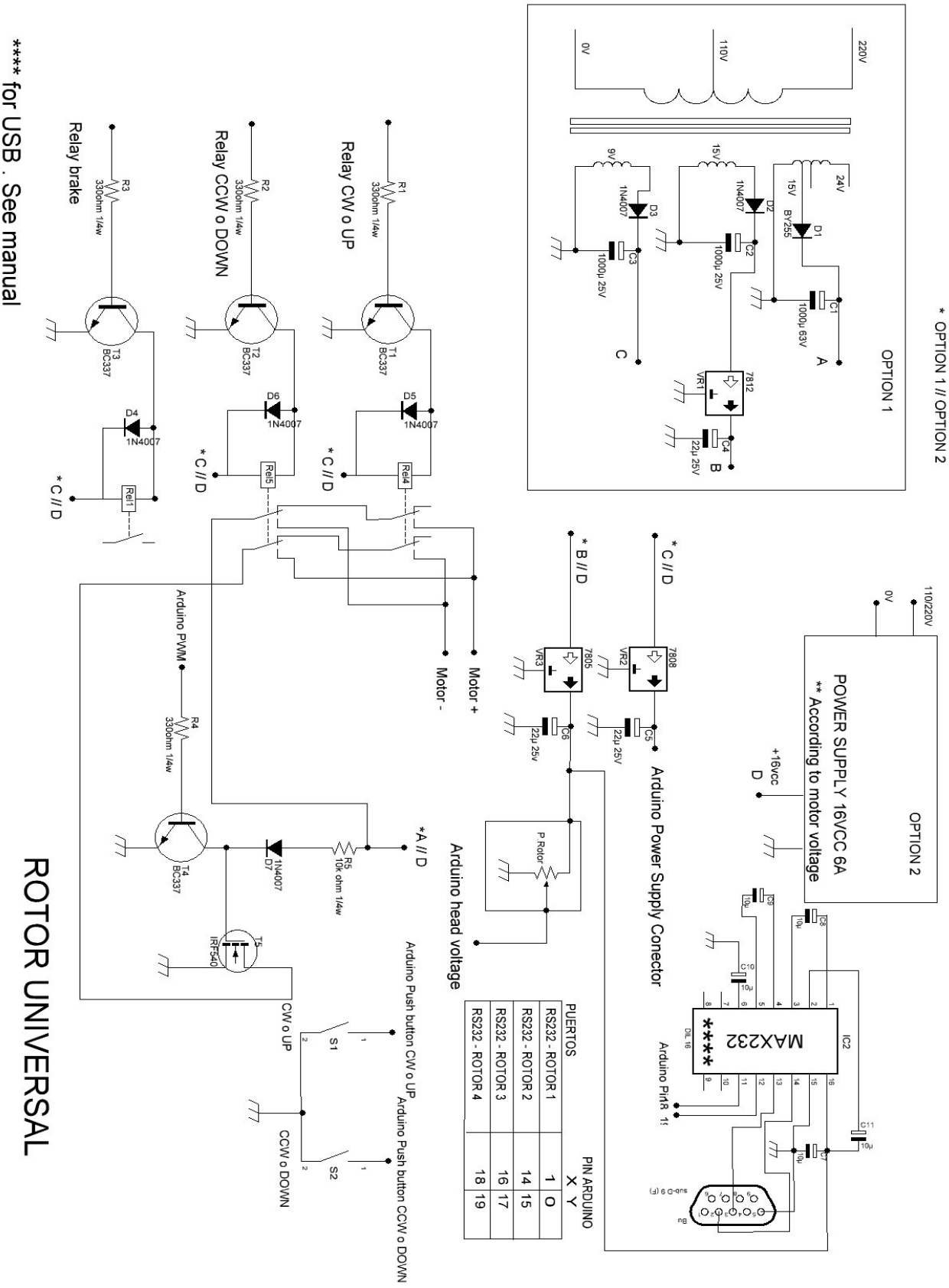
De-solder all the wires that are soldered to the switches for CW and CCW and connect them to their corresponding relays. Also de-solder the wires of the CALIBRATE potentiometer.
For the CCW and CW buttons, some wires need to be soldered to connect them to the Arduino.
The next schematic diagram you find the modifications and how the circuitry would become.


MODIFICATION HAM IV AND SIMILAR
X Rotor Connection Number
120/220 vac
F1
S1
Small Transformer
Tr1
A
B
D1
1N4007
C1
470µF 50V
R1
39 ohm 2W
13V 1W
D2
7
3
R2
1M 1/4 w
R3
470K 1/4 w
C3
100n
** Install in Arduino PCB
Arduino Pin
H
I
Relay IN3 (Brake)
PCB Relays
IN3
1
Relay IN1 (CW)
Pcb Relays
IN1
CW
6
Tr2
Big Transformer
Relay IN2 (CCW)
Pcb Relays
IN2
CCW
5
2
8
C2
120-140 mfd 40vac
4
CW
F
S2
Arduino pin
E
G
S3
Arduino pin
CCW
Pcb Relay
a
CW
b
c
CCW
d
e
BRAKE
f



The pins of the board IN1, IN2 and IN3 must be connected to the Arduino pins according to the chosen rotor number, as indicated in the pin table of Visual Rotor in Arduino.

SAMPLE CONTROL D.C.:



To modify the control of Prosistel, Yaesu or other controls, the simplest thing is to mount all the circuits in a separate box. In this way you will always have the original command. Carry out the circuit of the previous Page and install it inside your rotor control according to the shown diagram. If instead of the RS232 port you decide to install a USB port on Page 16 you have the circuit and its connection to Arduino.

VISUAL ROTOR UNIVERSAL KIT

The Visual Rotor Universal kit is designed to contain all the functions of your rotor with AC motor. or C.C., and can be easily adapted to this. On the same board are the relays for right turn (CW) and left turn (CCW) as well as the brake relay (for the rotors that have it), to be controlled by the Arduino.It also includes the circuit that generates the voltage to indicate the heading (valid for some rotors) as well as its conversion so that the Arduino can read it. It also adds electronic control for + - 1 degree resolution, as well as rotor stop / soft start control and speed control for DC rotors. The RS232 serial port is also included for the communication of Visual Rotor with the PC to be able to handle it with the different programs that allow it.

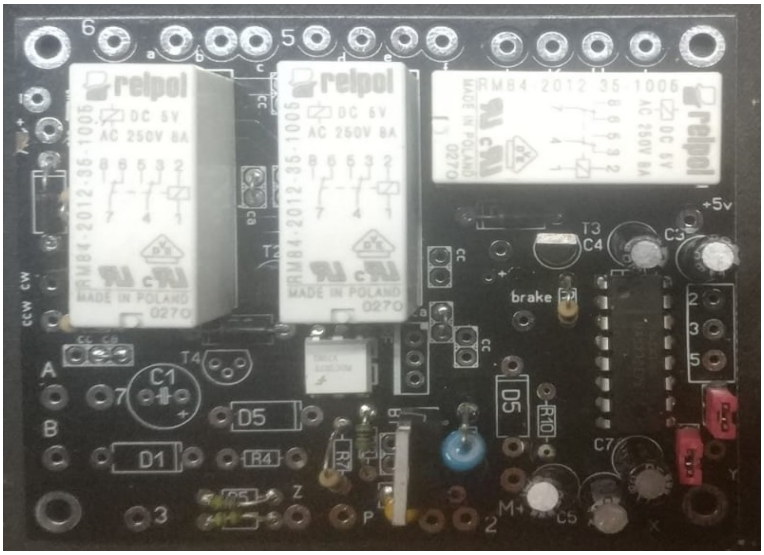
NOTE: At no time am I responsible for any damage that you may cause to your remote control.

VERY IMPORTANT: Use quality wiring, it will avoid many problems of malfunction.

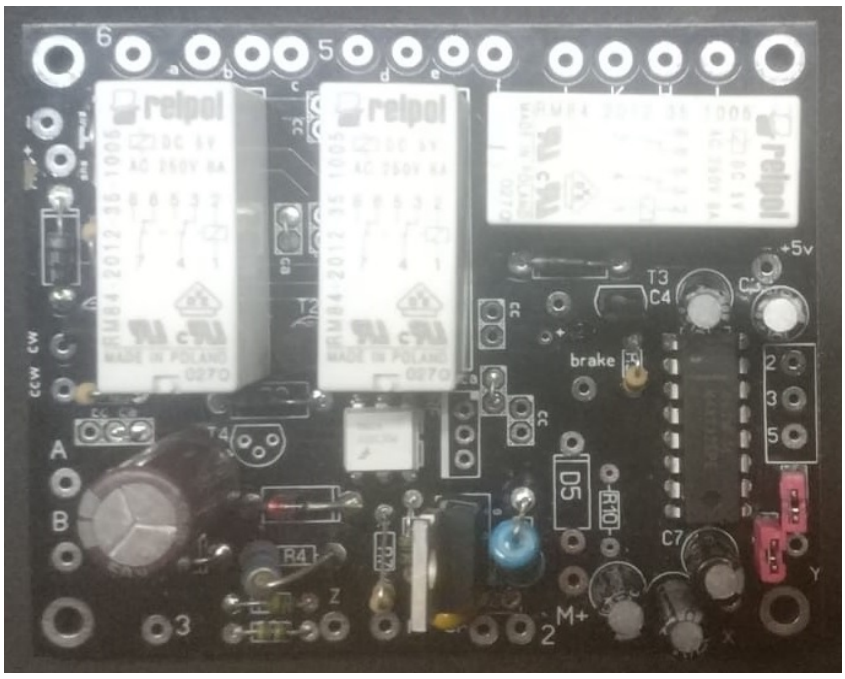
The Visual Rotor Universal kit is delivered fully assembled for the type of rotor requested.Its power supply is 5V DC.

There are 3 mounting versions:

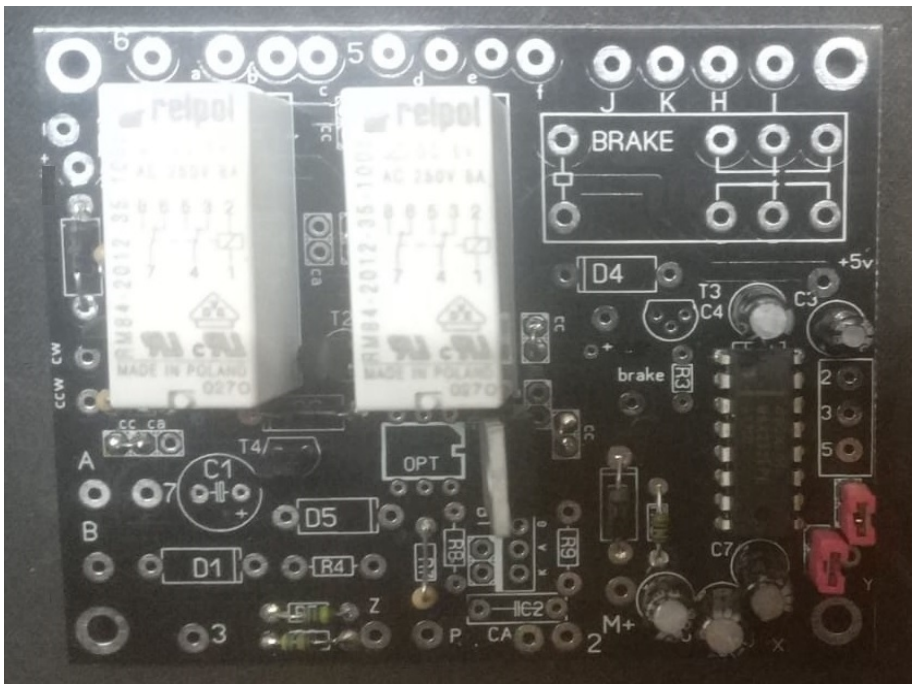
For rotors with AC motor:



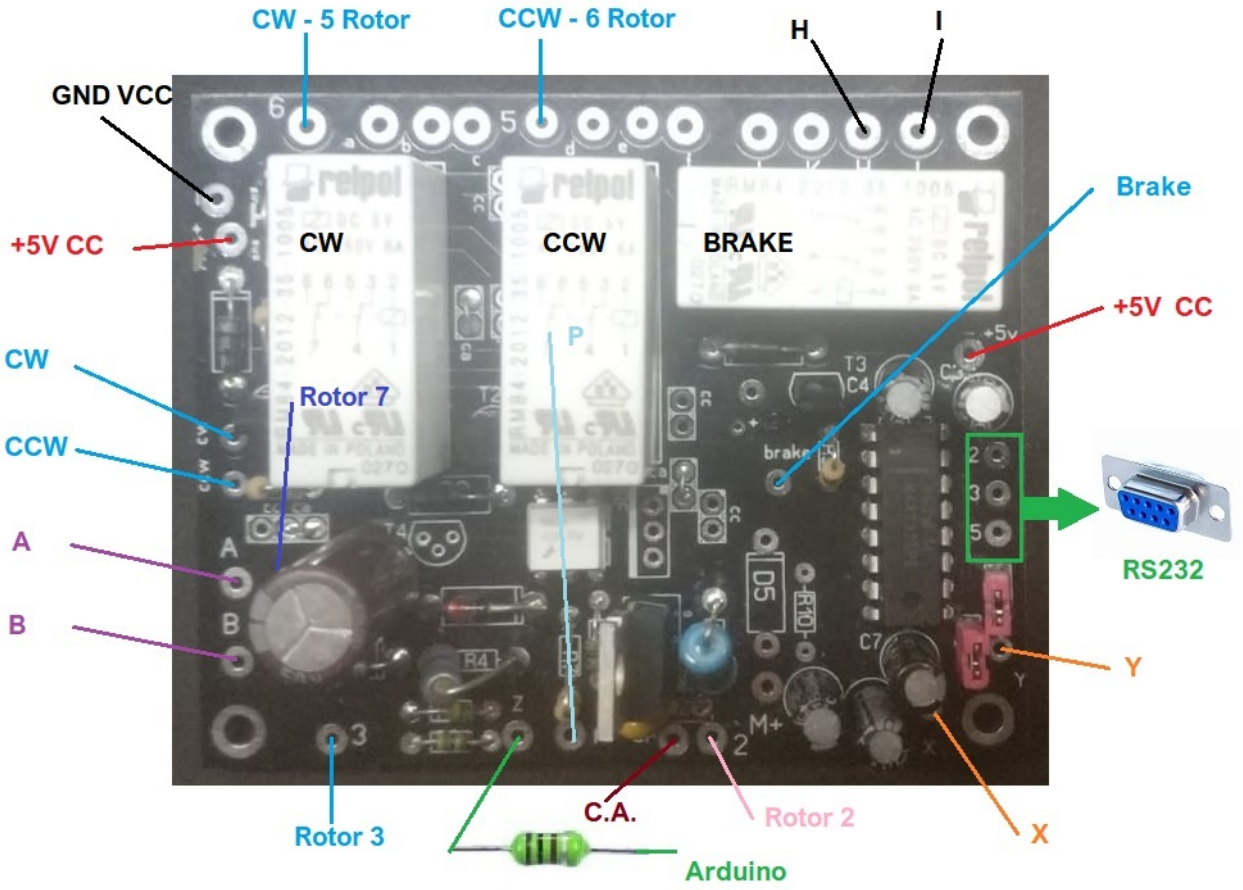
For rotors with AC motor (CDE-45, Ham III, IV, V etc with TFT screen):



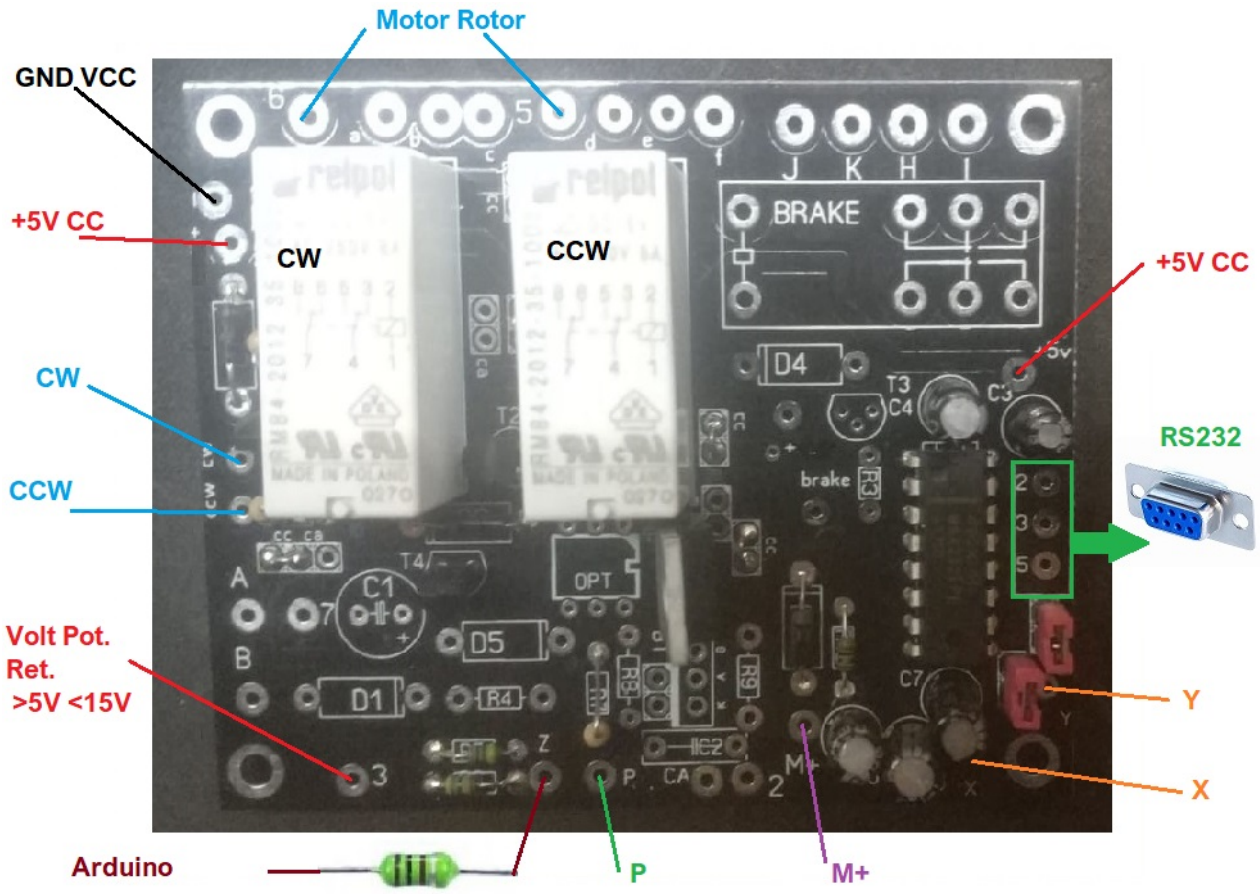
For rotors with DC motor :



CONNECTION POINTS FOR CDE, HAM IV, V, VI, ETC WITH TFT:



CONNECTION POINTS FOR DC MOTORS:



CONNECTION DESCRIPTION:

Common both to rotors with C.A. as from D.C.

+,+5V : Positive supply connection to + 5V DC

– : Negative connection of the power supply to -5V DC (Ground).

CW : Connection between the Universal Rotor Visual Kit and the arduino board. See table in manual.

CCW : Connection between the Universal Rotor Visual Kit and the arduino board. See table in manual.

2,3,5: Located to the right of the MAX232 Integrated Circuit on the board, it allows the connection between the Universal Visual Rotor Kit and the output of its RS232 connector for connection with the PC.

5: Connection between the Universal Rotor Visual Kit and the output of its rotor for the rotation to the left of this (Relay).

6 : Connection between the Universal Rotor Visual Kit and the output of its rotor to rotate it to the right (Relay).

P: Connection between the Universal Rotor Visual Kit and the arduino board. Corresponds in the table to PWM positions. See table in manual.

X: Connection between the Universal Rotor Visual Kit and the arduino board. It corresponds in the table to the port positions. See table in manual.

Y: Connection between the Universal Rotor Visual Kit and the arduino board. It corresponds in the table to the port positions. See table in manual.

Z: Connection between the Universal Rotor Visual Kit and the arduino board. Corresponds in the table to the bearing reading positions. See table in manual.

Rotors with C.A. motor

Brake : Connection between the Universal Rotor Visual Kit and the arduino board. Only for the case that your rotor has a brake (Example, Ham IV, V, etc). See table in manual.

A: Connection between the Universal Rotor Visual Kit and the small power supply transformer to indicate the direction of the rotors control knobs (CDE-45, Ham III, IV, V etc).

B: Connection between the Universal Rotor Visual Kit and the small power supply transformer to indicate the direction of the rotors control knobs (CDE-45, Ham III, IV, V etc).

CA : Connection between the Universal Rotor Visual Kit and the power supply of your motor.

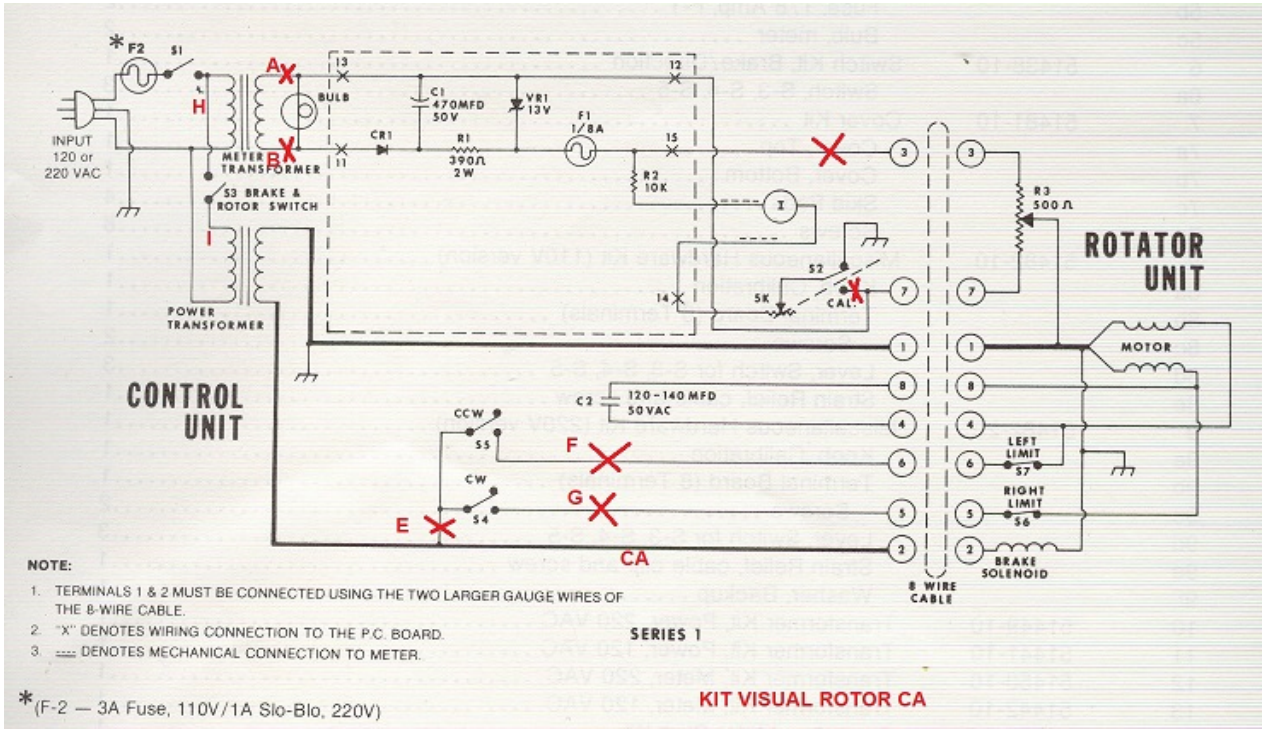
H,I : Connection between the Universal Rotor Visual Kit and its rotor output to unlock the rotor brake (Relay).

3 : Connection between Universal Rotor Visual Kit and return of the heading reading potentiometer.

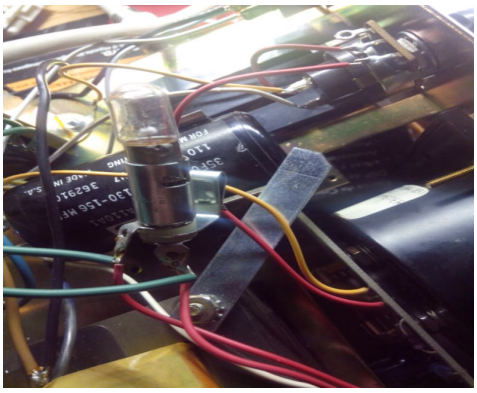
7 : Connection between the Universal Rotor Visual Kit and the power supply of your motor. (CDE-45, Ham III, IV, V etc).

Rotors with DC motor

M+:Connection between the Universal Rotor Visual Kit and the positive power supply of your motor. Valid only for DC motors.

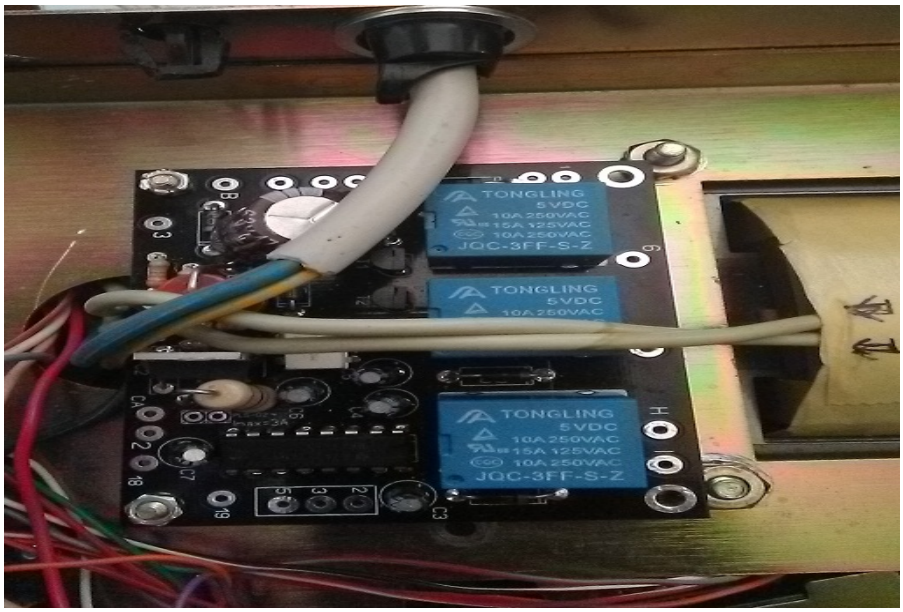


The installation of the Visual Rotor CA kit in the Ham IV rotor control box is simple.

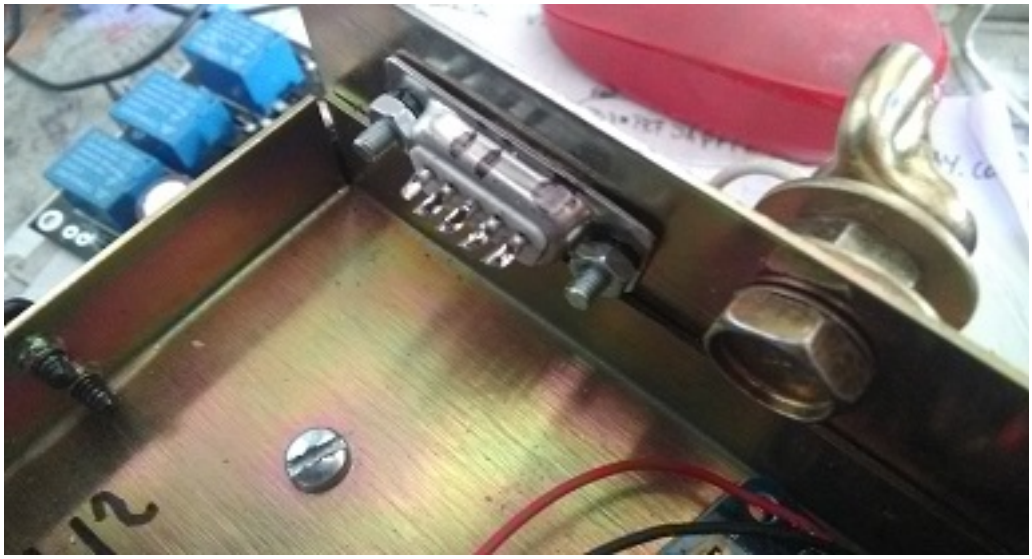


Unplug the AC power from your controller. Unscrew the top and bottom cover. You need to return the lamp bulb, its support and the PCB screwed to the meter. Carefully return the meter and bezel from it. Unsolder the wires between the PCB and the meter, leaving the wires to the PCB. Do the same with the CALIBRATE potentiometer. Unsolder the wires that come from the small transformer to the bulb holder. These wires will be A and B as indicated in the diagram and on the PCB of Visual Rotor CA Kit.

In the lower part of the control you can install the printed circuit of the Universal Rotor Visual Kit
Drill the necessary holes to screw the printed circuit board. Next solder the wires as shown in the schematic diagram. The wires that are in the upper part of the housing can pass to the bottom of the housing through the big hole which is already there.

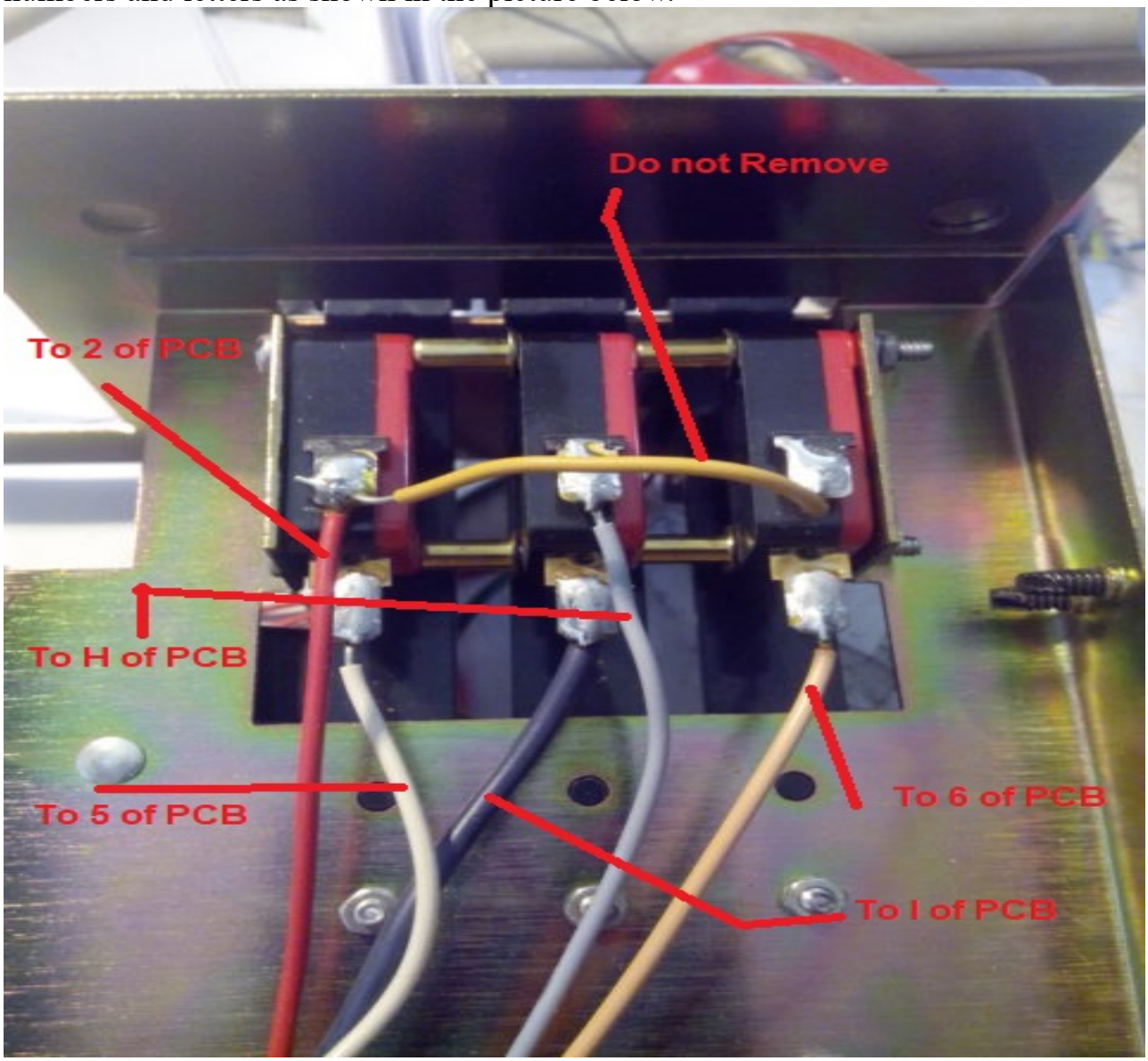


In case you have the RS-232 option installed, drill the necessary holes to place the RS232 connector on the back of the remote control.



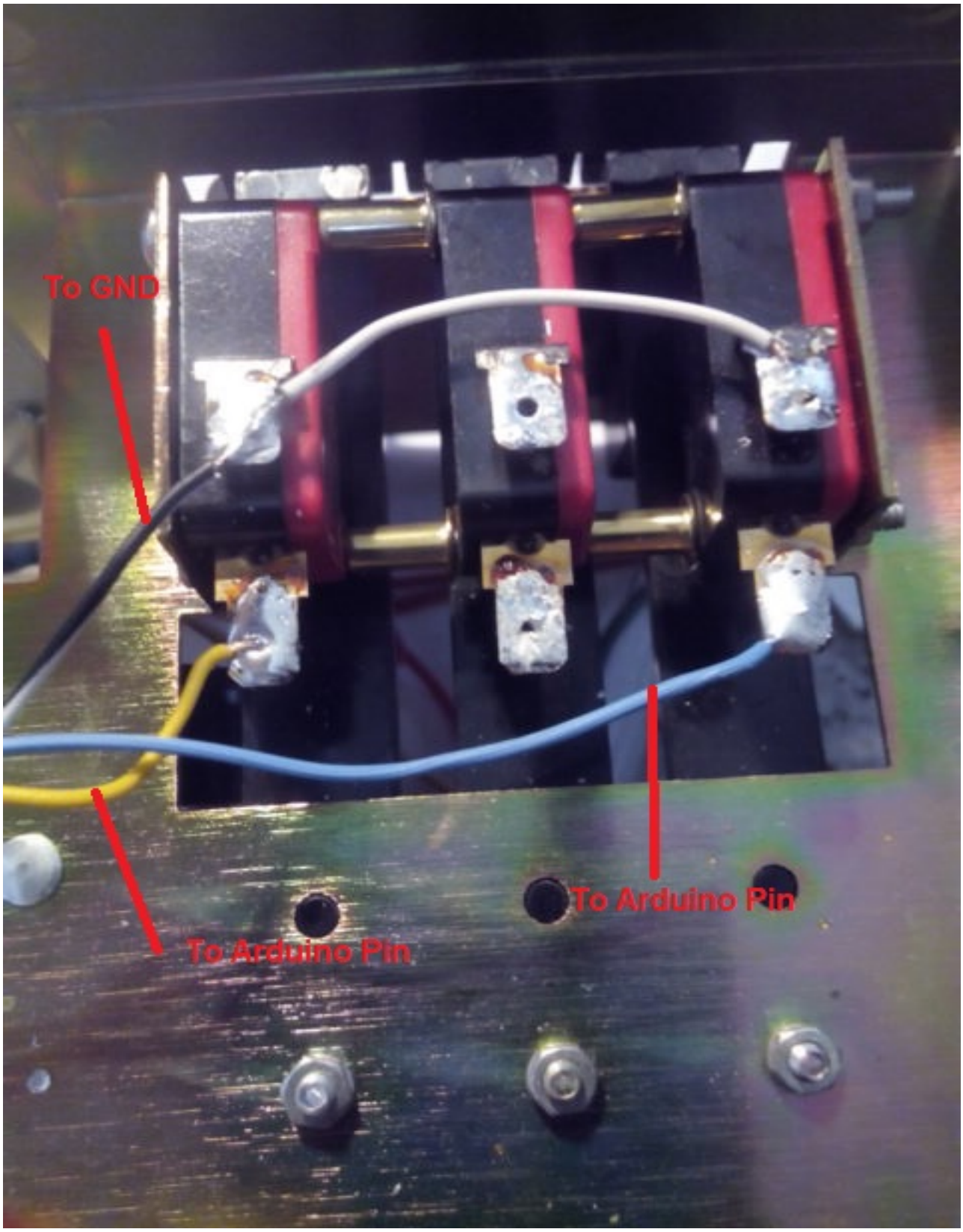
Solder the wires that will go from the PCB marked as 2,3,5 next to the IC, to the pins 2, 3 and 5 of the RS232 connector.

Solder the wires that come out of the small transformer and that were previously soldered to the bulb holder points A and B of the PCB. They are usually Green. Unsolder the wires of the push switches (CW, CCW and BRAKE)located in the lower part of the rotor controller housing and solder them on the PCB following the numbers and letters as shown in the picture below.

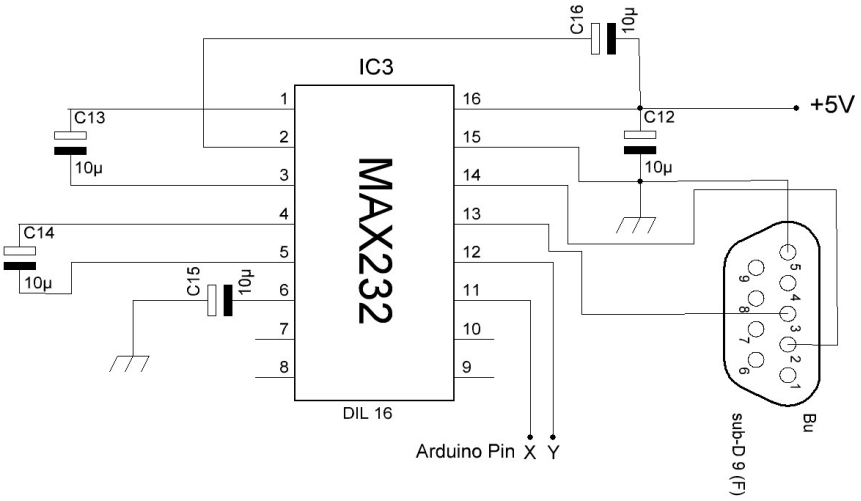


Solder a wire in the circuit on pad 3 and solder it to the same number as the rotorcable-terminal on the back of the terminal. With pad 7 of the PCB solder a wire and also solder it to the same number of the rotorcable-terminal.

Suelde tres cables en los pulsadores de rumbo que se conectarán más tarde al Ardunio.



In case you have the RS-232 option installed:



PUERTOS/PORTS	PIN ARDUINO X	Y
RS232 - ROTOR 1	1	0
RS232 - ROTOR 2	16	17
RS232 - ROTOR 3	14	15
RS232 - ROTOR 4	18	19

Solder a wire on pad 18 (MARKED AS X IN THE SCHEME) of the printed circuit and solder it on the Arduino pin according to the rotor number where the kit is installed to. (see above table).
Solder a wire in pad 19 (MARKED AS Y IN THE SCHEME) of the printed circuit and solder it in the same pin of the Arduino according to the number where the kit is installed to. (see above table).

In case you have installed the ELECTRONIC SOFT START/STOP CONTROL option:
Solder a wire on the P pad and solder it on the pin corresponding to Arduino PWM Pin according to the connection table.

Solder a wire on the Z pad and solder it on the pin corresponding to the Arduino Pin for reading the heading according to the connection table. Do not forget to solder a 100nF capacitor between this pin and ground, chassis, - or GND.

Solder a wire on the left pad of R1 and solder it on the pin corresponding to the Arduino Pin of CW Relay according to the connection table.
Solder a wire on the left pad of R2 and solder it on the pin corresponding to Arduino Pin of CCW Relay according to the connection table.
Solder a wire on the left pad of R3 and solder it on the pin corresponding to Arduino Pin of Relay for Locking of Rotor (brake) according to the connection table.
Solder the push-microswitch-wires on the corresponding Arduino pins according to the connection table.
Solder the + and - 5VDC wires from the PCB to the power supply for the operation of the entire kit. Solder two + and - 5VDC wires to power the Arduino board. Connect + to the Arduino pin marked with 5VDC and the - to the pin marked as -

Next check if all wiring is correct!

To fix the screen to the front of the control box you can use doublesided adhesive tape attached to the black frame that surrounds the screen.

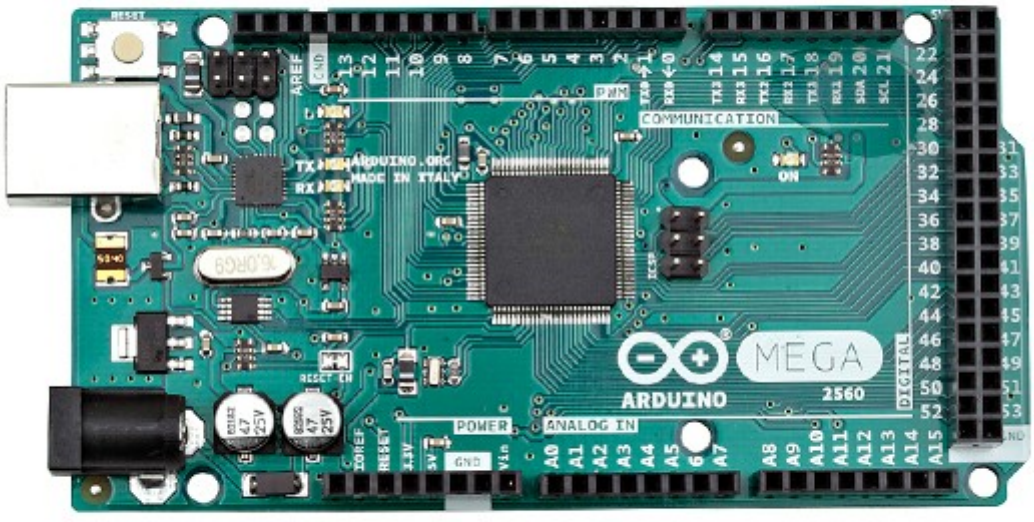
Connection example:

Example of connection as Rotor 1 in Visual Rotor according to connection table:

CW and CCW pushbuttons: CW pin 28, CCW pin 29 of Arduino. The negative wire of the push buttons to any point of chassis, ground or - of the circuitry.

CW relay: from the left pin of R1 of the printed circuit to pin 34 of Arduino
CCW relay: from the left pin of R2 of the printed circuit to pin 35 of Arduino
Brake relay (if applicable): from the left pin of R3 of the printed circuit to pin 30 of Arduino.

Heading Voltage Reader (also known as rotor-potentiometer): from pin Z of the PCB to pin A6 of Arduino.
Electronic Soft Start/Stop Control: from pin P of the printed circuit to pin 2 of Arduino.
RS232, pin 18 of the printed circuit with pin 1 of the Arduino and pin 19 of the PCB with pin 0 of the Arduino.



Configuration following the example:

Access the Menu:
-Rotors: select Name ... Rotor 1 and change the name to HAM IV, for example.

Access the Menu:
-Rotors: Select Type and select Rotation.

Access the Menu:
-Ramp/Ext: select “Ramp” and select the value for the ramp. It is only valid in “Relays or “Rotor AC” configuration.

Access the Menu:
-Ramp/Ext: select “Extention” and select the value 0.

Access the Menu:
-Mode: select “Normal” or “Relays” if you didn’t install the Electronic Soft Start/Stop Control hardware. If we have the Electronic Soft Start/Stop Control installed, select “Rotor AC”.

Access the Menu:

- Center: As the majority of rotors the end-stops have them in the South (180 degrees), select North. Otherwise select South.

Access the Menu:
-Tools: select Sound. Select % to set the audio level.

Access the Menu:
-Tools: select RS232. Select if you want to communicate with the PC.
-Tools: select “Baud”. Select the desired Baud rate.

Access the Menu:
-Tools: select VDC Arduino. Measure the operating voltage of your Arduino on one of the pins that are indicated as “5V” and enter that value into this section.

Access the Menu:
-Limits: select “Right” and follow instructions.

Access the Menu:
-Limits: select “Left” and follow instructions.

Visual Rotor for Android:

You can use an Android device with Wifi (with an Android version equal to, or greater than 4.4) with all the functions of Visual Rotor without having to use the TFT screen, MicroSD card or speaker that is needed in the normal version of Visual Rotor. **In case you install the TFT screen, Android operation is disabled**. For Visual Rotor Android you only need to record the Visual Rotor software in the Arduino and download and install the Android application on your device.

In this way, all the circuitry can be installed inside any rotor control command, without external wires, etc., also allowing the original operation of the command in case of emergency, or not wanting to use Visual Rotor at any given time.

All rotor control remains in the Arduino Mega, so if at any given time you would lose the connection, you won't have to worry about anything.

VISUAL ROTOR CONNECTION WITHOUT TFT DISPLAY (ANDROID):

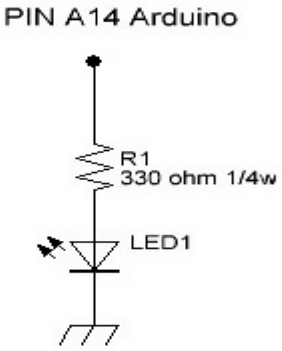
The connection of the different features for Visual Rotor to work is very easy and simple. Is required:

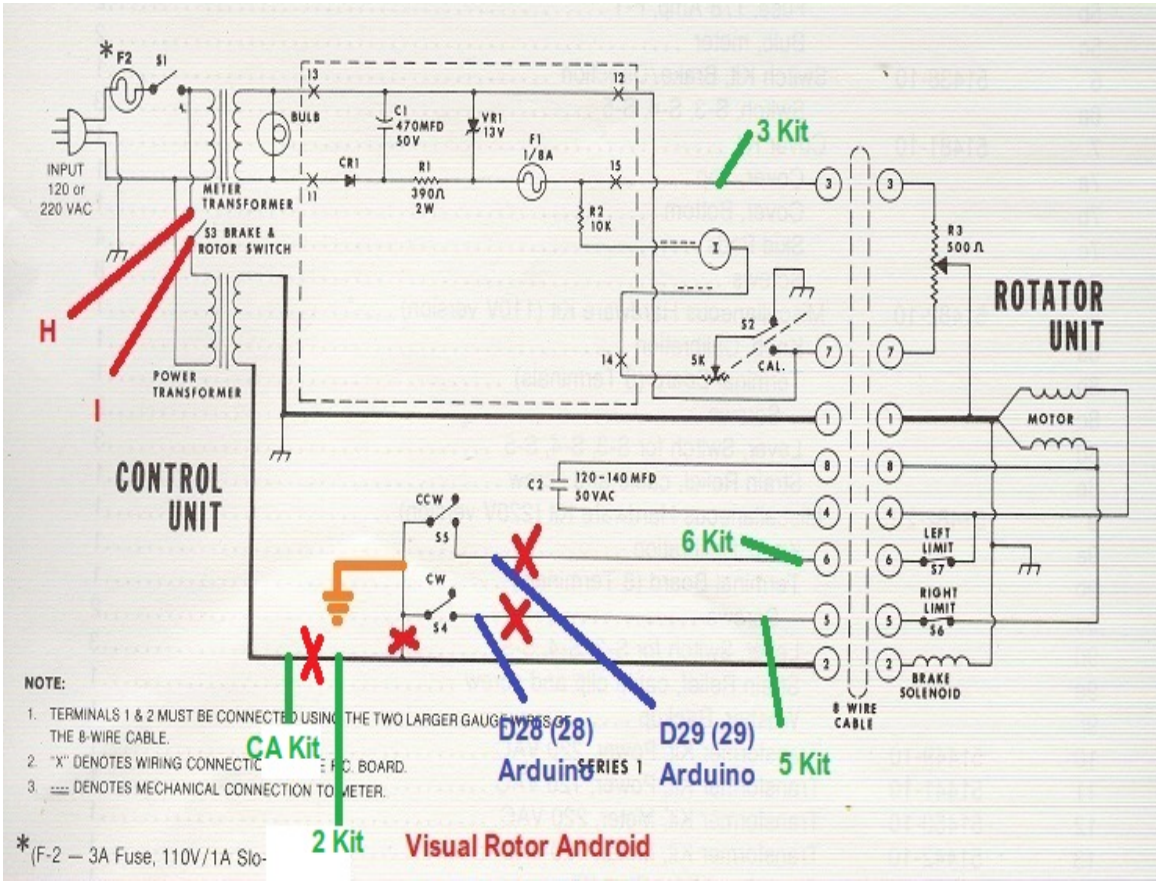
1) Arduino Mega 2560 with suitable data-cable to connect to the PC and to load the software.
2) W5100 LAN module or W5500.
3) PCB with Relays (Required for some rotors).
4) Voltage divider according to rotor (Made with 2 ¼ watt resistors).
As an option:
5) MAX232 Integrated Circuit and 5 Electrolytic Capacitors or TTL-USB Converter.
6) Electronic soft start / stop circuit.
7) Diode LED + 330 Ohm ¼ Watt resistor.
8) 5V Power Supply of at least 600mA

Or **Visual AC Rotor Kit** (only for rotors with AC motor), which contains points 3,4,5 and 6 (as in the figure below).

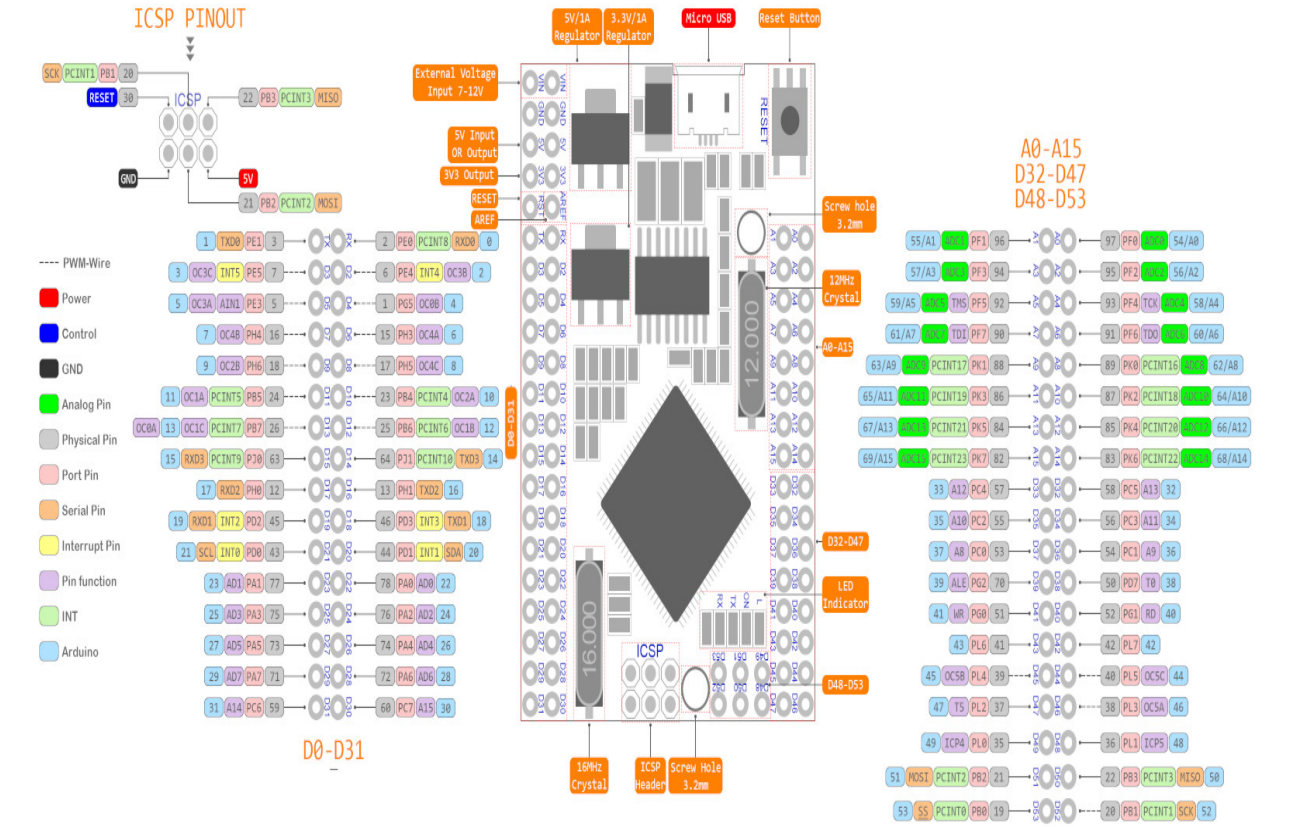
The connection of these features is the same as if you use Visual Rotor installing the TFT screen, except that the LED and the resistor are installed on pin A14 of the Arduino Mega, to indicate that it is ready to connect through Android.

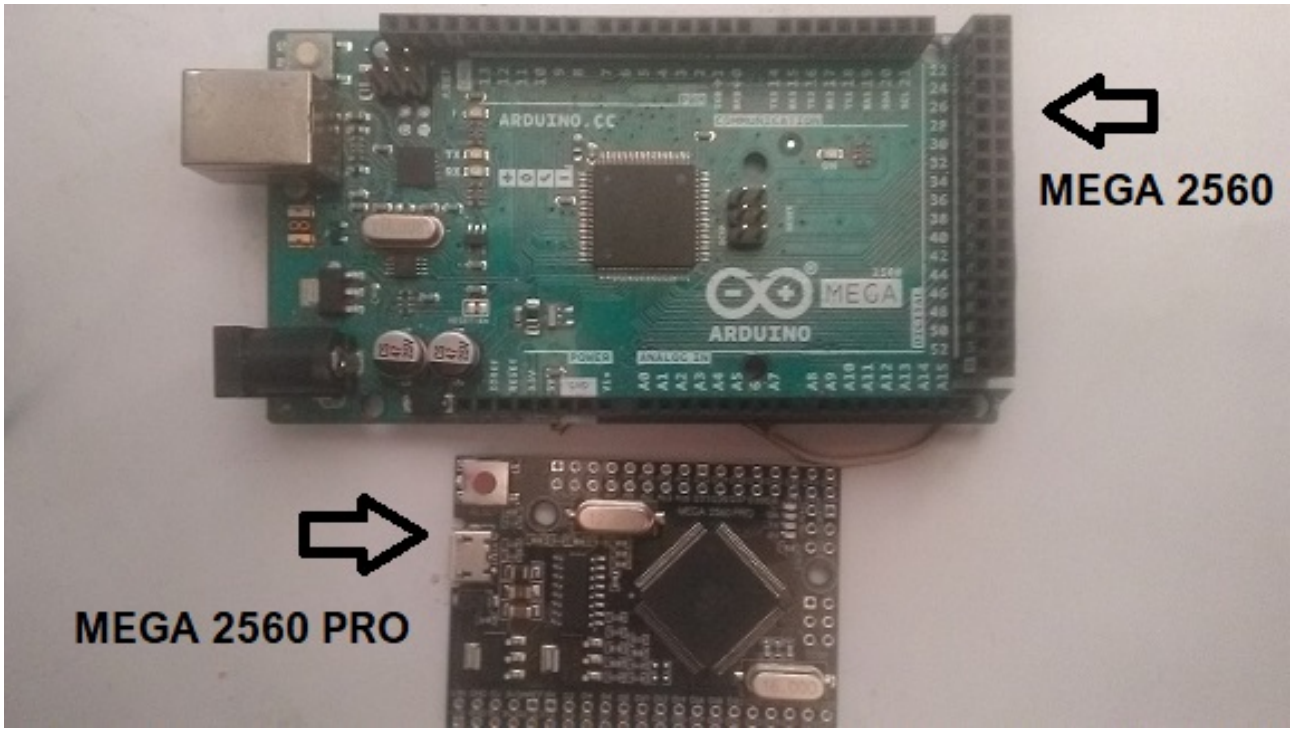
The functions of the program are exactly the same, with the same menus of functions allowing all the options available for Visual Rotor with TFT screen, except that the Android version does not allow to enable/disable the LAN option and the rotating graphic option of Numbers is different.


PIN A14 Arduino
R1
330 ohm 1/4w
LED1


INPUT
120 or
220 VAC
METER
TRANSFORMER
S3 BRAKE &
ROTOR SWITCH
POWER
TRANSFORMER
BULB
C1
470MFD
50V
CR1
R1
390Ω
2W
YR1
13V
F1
1/8A
R2
10K
5K
CAL.
S2
R3
500Ω
ROTATOR
UNIT
MOTOR
CONTROL
UNIT
C2
120-140 MFD
50VAC
CCW
S5
CW
S4
LEFT
LIMIT
S7
RIGHT
LIMIT
S6
BRAKE
SOLENOID
8 WIRE
CABLE
3 Kit
6 Kit
5 Kit
2 Kit
CA Kit
D28 (28)
Arduino
D29 (29)
Arduino
SERIES 1
Visual Rotor Android
H
I
NOTE:
1. TERMINALS 1 & 2 MUST BE CONNECTED USING THE TWO LARGER GAUGE WIRES OF
THE 8-WIRE CABLE.
2. "X" DENOTES WIRING CONNECTIC
P.C. BOARD.
3. DENOTES MECHANICAL CONNECTION TO METER.
*(F-2 — 3A Fuse, 110V/1A Slo-

MEGA PRO ARDUINO INSTALLATION NOTE FOR ANDROID:





Unlike Arduino Mega 2560 R3, for Android it comes with the Arduino Mega 2560 pro. Basically they are similar to each other, only the distribution of the pins or ports differ. With Arduino Mega 2560 R3 allows the TFT screen to be connected to the Arduino board into the headers and therefore can be easily attached to the front of the rotor controller with double-sided adhesive tape. If the Android application will be used, it is more convenient to use with Arduino Mega 2560 Pro. Besides that, the PCB is smaller and may have a better fit in other rotor controller housings. since the "Pro" version comes generally without pinheaders it is faster to install.

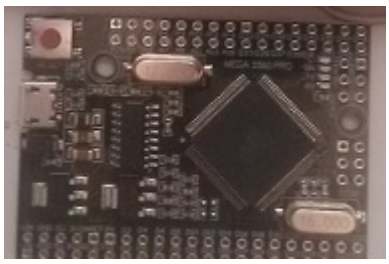
There are two small differences with the nomenclature of the Arduino Mega 2560. The analog gates in both Arduinos correspond in the nomenclature and are indicated as A0, A1, ... A15.The digital gates of the Mega 2560 Pro are indicated with a D in front of the gate number. As an Example: Door D38 in Mega 2560 Pro, is the same as door 38 in the Arduino Mega 2560.

In the Arduino Mega 2560 Pro the gate indicated as RX is gate 0 in the Arduino Mega 2560 and the TX gate in the Pro is gate 1 in the Arduino Mega 2560.

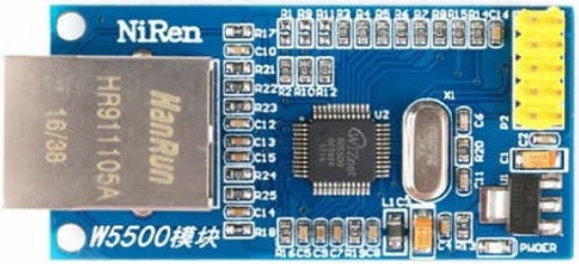
VR-ANDRO KIT COMPOSITION:

The VR-ANDRO Kit consists of the following circuitry:

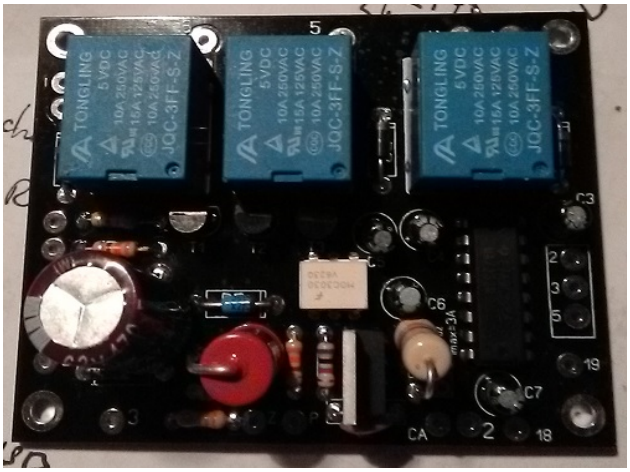
Arduino MEGA 2560 Pro + USB Wire.

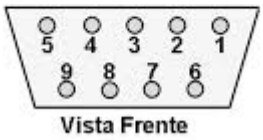


W5100 LAN module or W5500 LAN module.



Visual AC Rotor Kit + DB9 Female Connector.





LED and 330 ohm ¼ W resistor not included.

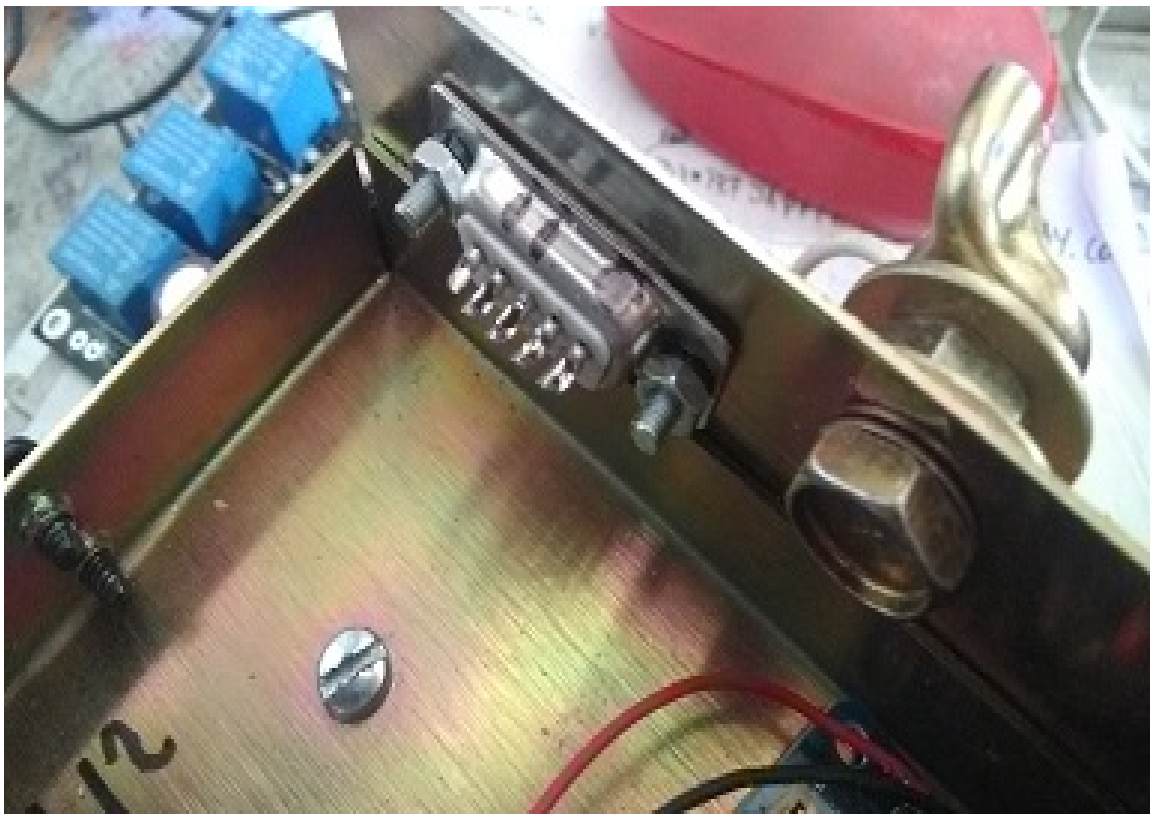
EXAMPLE OF INSTALLATION OF THE VR-ANDRO KIT INSIDE A HAM IV ROTOR CONTROL.

CD45, HAM II, HAM III, HAM IV, HAM V, HAM VI,HAM VII

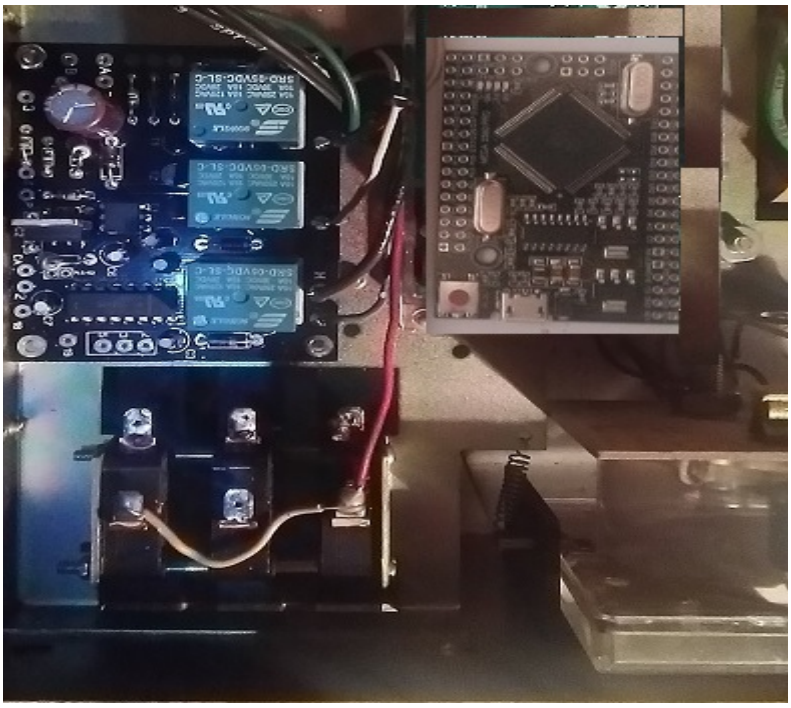
As Visual Rotor allows to handle up to four rotors, start in this example of the connection as Rotor 2. Note: Port 1 of Arduino is shared to record the program on it, so if you have pins 0 and 1 (RX and TX) connected to the serial port circuit (MAX232 or TTL_USB converter) you must disconnect them to be able to program the Arduino.

Although the circuit boards can be installed anywhere in the rotor control, where more space is inside the housing is at the bottom.

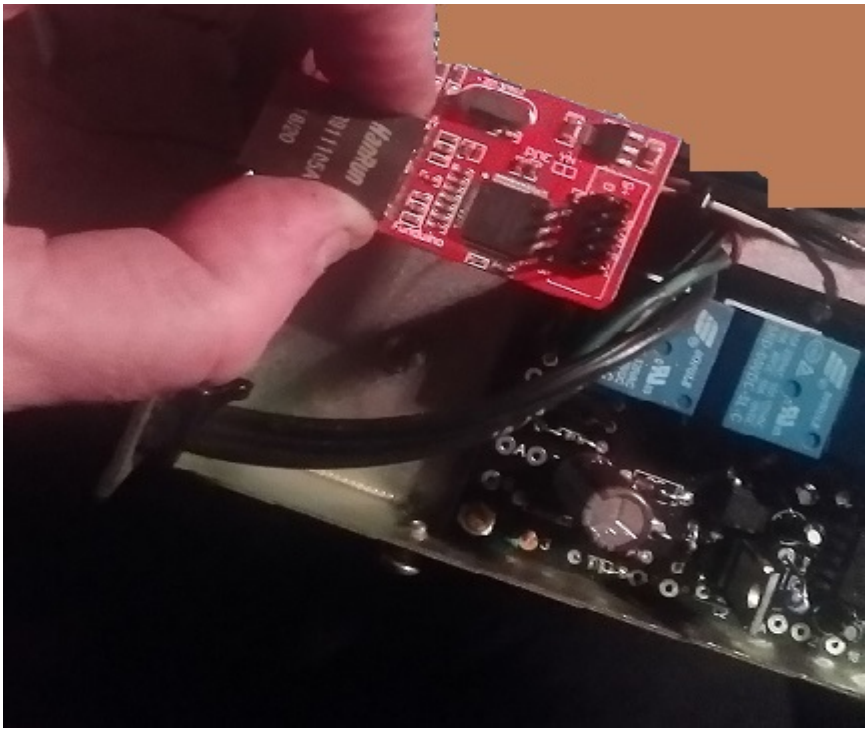
Install the DB9 connector on the back of the controller.



Make the necessary holes in the sheet to fix the arduino and the Visual Rotor Universal Kit board.



Make the square hole in the housing for the W5100 LAN Module connector. Once wired fix it with a strong glue.



Once this is done, prepare the **wiring between the Arduino and the Kit Visual Rotor CA** PCB, according to the connection table on page 32-33 and 77.

solder a wire from pin 36 of the Arduino to the pin of the Pad kit located to the left of the R1 resistor.

solder a wire from pin 37 of the Arduino to the pin of the Pad kit located to the left of the R2 resistor.

solder a wire from pin 32 of the Arduino to the pin of the Pad kit located to the left of the R3 resistor.

solder a wire from pin 16 of the Arduino to the pin of the kit marked 18.

solder a wire from pin 17 of the Arduino to the pin of the kit marked 19.

solder a wire from pin A7 of the Arduino to the pin of the kit marked Z
solder a wire from pin 3 of the Arduino to the pin of the kit marked P.

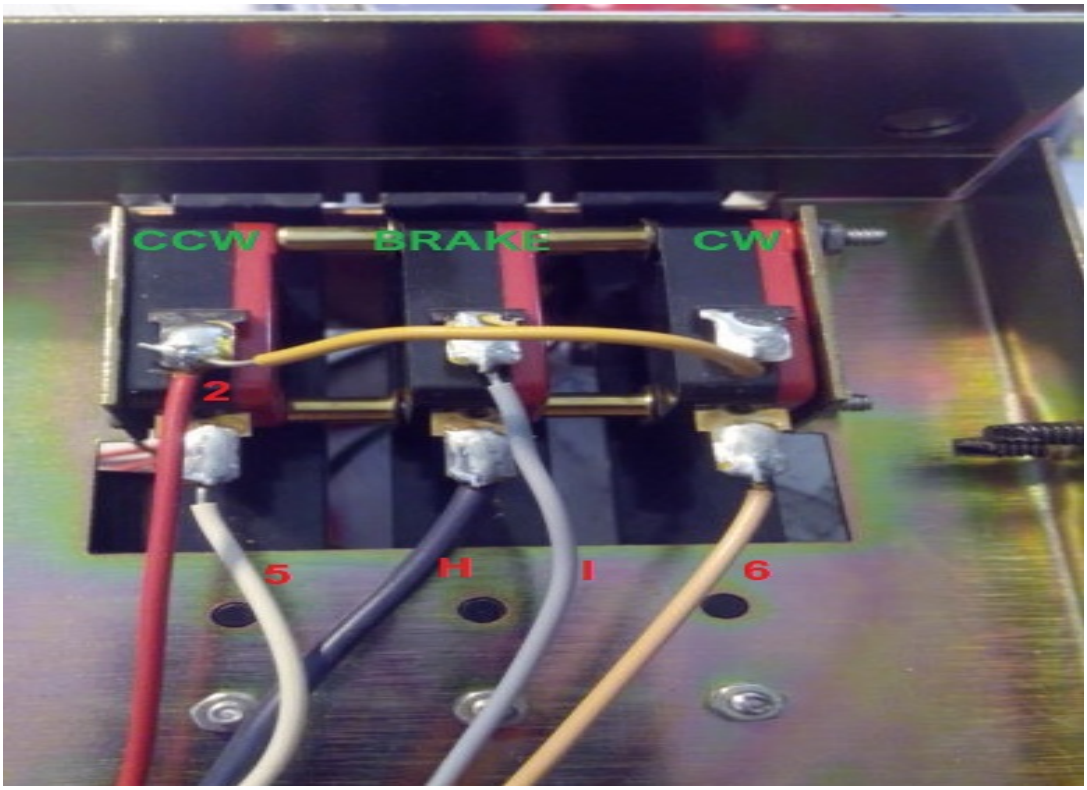
Wiring between the DB9 connector and the Kit board: wiring page 77.

solder a wire from pin 2 of the kit to pin 2 of the DB9.

solder a wire from pin 3 of the kit to pin 3 of the DB9.

solder a wire from pin 5 of the kit to pin 5 of the DB9.

Wiring between CCW, Brake and CW buttons on the controller and the Kit board:



desolder the CW push button wire (6 in the picture) and solder it to pad 6 of the kit. Relay CW (RL1)

desolder the CCW push button wire (5 in the picture) and solder it to pad 5 of the kit. CCW relay (RL2)

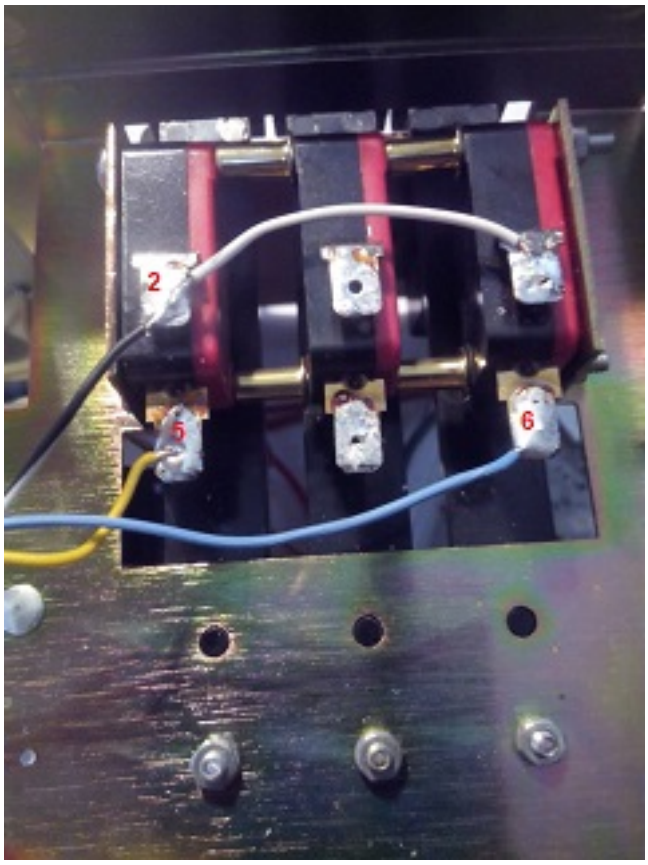
desolder the wire of the BRAKE button (H in the picture) and solder it to the pad H of the kit. BRAKE Relay (RL3)

desolder the wire of the BRAKE button (I in the picture) and solder it to pad I of the kit. BRAKE Relay (RL3)

desolder the wire of the CCW button (2 in the picture) and solder it to pad 2 of the kit.

☐ solder a wire of the CCW button (2 in the picture) and solder it to any point of ground or GND.

Wiring between CCW, Brake and CW buttons on the remote control and Arduino:



solder a wire on the CCW button (2 in the picture) and solder it to any point of ground or GND.

solder a wire on the CCW button (5 in the picture) and solder it to pin 29 of the Arduino.

solder a wire on the CW button (6 in the picture) and solder it to pin 28 of the Arduino.

Wiring between the rear 8-pin connector of the rotor and the Kit:

desolder the wire that comes from the large transformer of the control that is soldered to pin 2 of the rear cable terminal of the rotor control and solder it in the AC pad of the Kit.

solder a wire from pin 3 of the rear cable terminal of the rotor control and solder it to pad 3 of the Kit.

Wiring between LAN module W5100 and Arduino:

solder a wire from the SS pin of the W5100 LAN module to pin 10 of the Arduino.

solder a wire from the MO pin of the W5100 LAN module to pin 51 of the Arduino.

solder a wire from the MI pin of the W5100 LAN module to pin 50 of the Arduino.

solder a wire from pin CK of the LAN module W5100 to pin 52 of the Arduino.

Install a small power supply inside the rotor control box with 5VDC output and at least 600mA.

From the positive output of the power supply, solder a wire to the Arduino pin marked 5V.

From the negative output of the power supply, solder a wire to the Arduino pin marked GND.

From the positive output of the power supply, solder a wire to the pin of the kit marked + 5V.

From the negative output of the power supply, solder a wire to the pin of the kit marked as -.

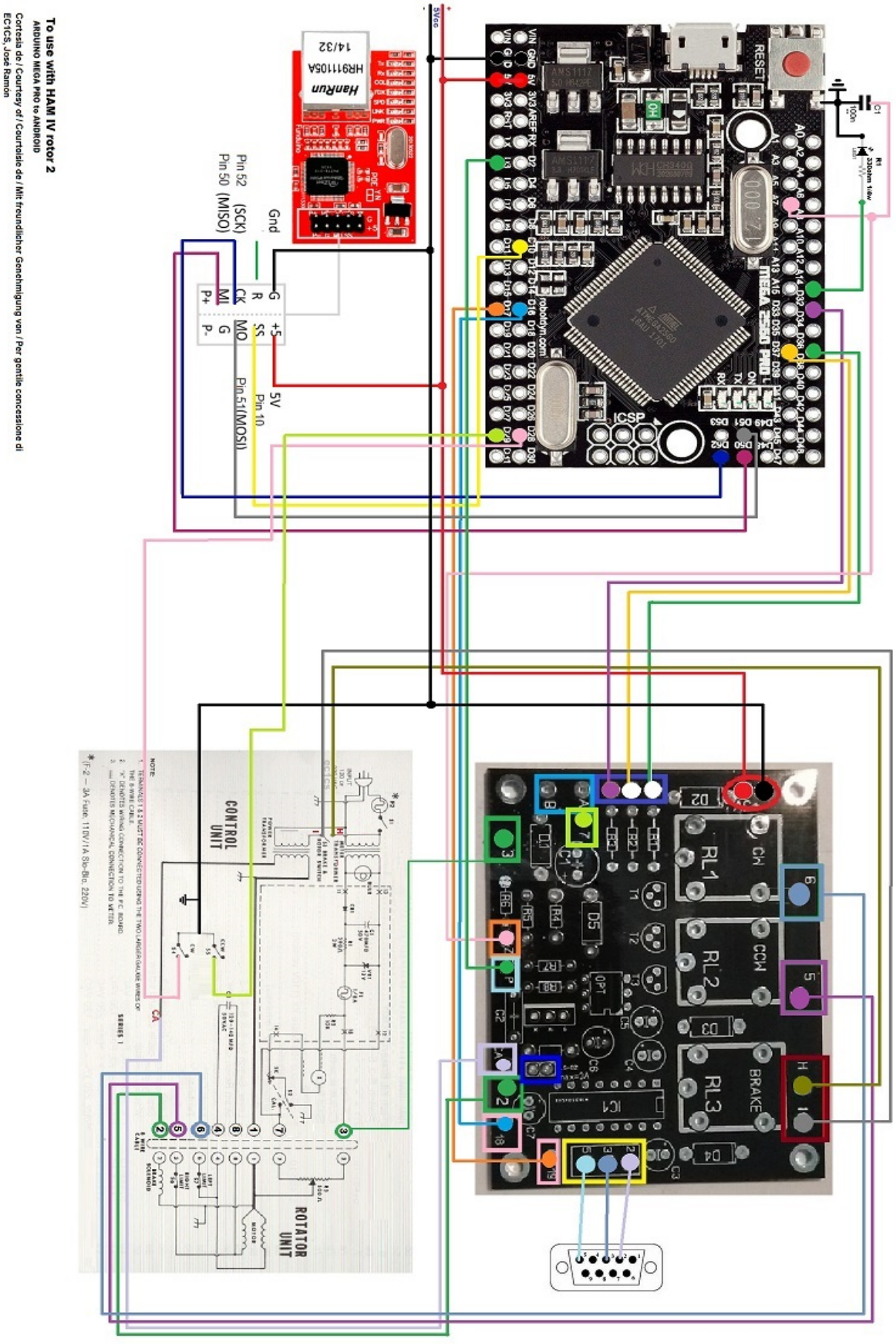
From the positive output of the power supply, solder a wire to the pin of the W5100 LAN module as +5.

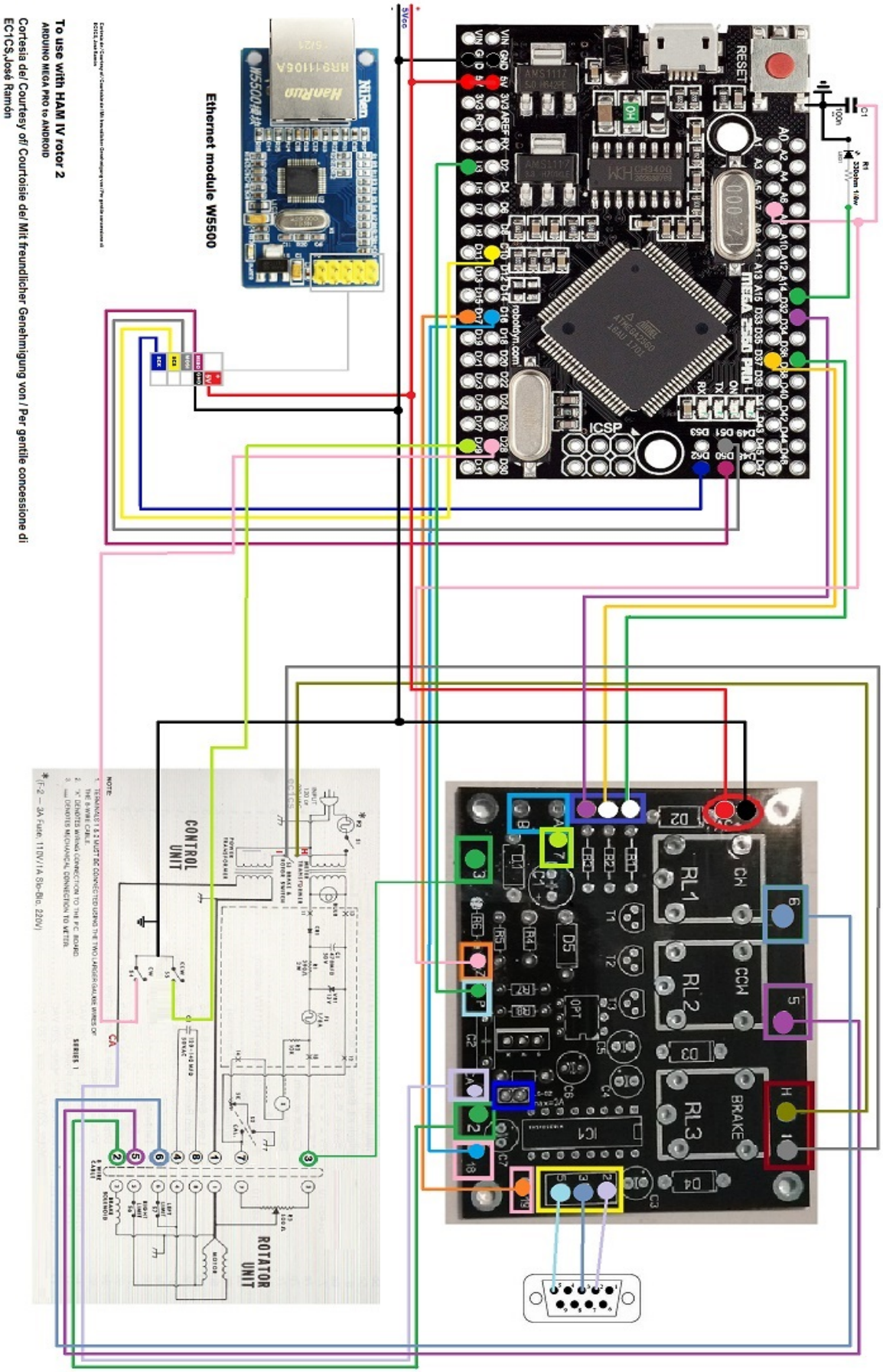
From the negative output of the power supply, solder a wire to the pin of the W5100 LAN module as G.

LED wiring and Arduino:

Solder one end of a 330 Ohm ¼ W resistor on pin A14 of Arduino. Solder a wire to the other end of the resistor. The longest pin of the LED diode will be soldered to the other end of this wire. Solder a wire to the GND pin of the Arduino and to the shortest pin of the LED diode.

Glue this LED to the direction meter housing of your morph control that the luminous tip near the hole of the calibration screw of the direction meter.


To use with HAM IV rotor 2
ARDUINO MEGA PRO to ANDROID
Cortesía de / Courtesy of / Courtoisie de / Mit freundlicher Genehmigung von / Per gentile concessione di
EC1CS, José Ramón
Pin 52 (SCK)
Pin 50 (MISO)
Gnd
5V
Pin 10
Pin 51(MOSI)
CONTROL UNIT
ROTATOR UNIT
RL1
RL2
RL3
CW
CCW
BRAKE
ICSP
RESET


To use with HAM IV rotor 2
ARDUINO MEGA PRO to ANDROID
Cortesia de/ Courtesy of/ Courtoisie de/ Mit freundlicher Genehmigung von / Per gentile concessione di
EC1CS,José Ramón
Ethernet module W5500
CONTROL UNIT
ROTATOR UNIT
RL1
RL2
RL3
BRAKE
ICSP
RESET

Configuration of HAM IV following the configuration of the example:

activate Rotor 2.
access the Menu: (M button)
-Rotors: select Name ... Rotor 2 and change the name to HAM IV,

access the Menu:
-Rotors: select Type and select Rotation.

access the Menu:
-Ramp/Ext: select the value for the Ramp you want. It is only valid in “Relays” or “AC Rotor”, format “Overlap” or “Extention” leave 0

access the Menu:
-Mode: select Rotor AC to activate the electronic control.

access the Menu:
-Center: select North.

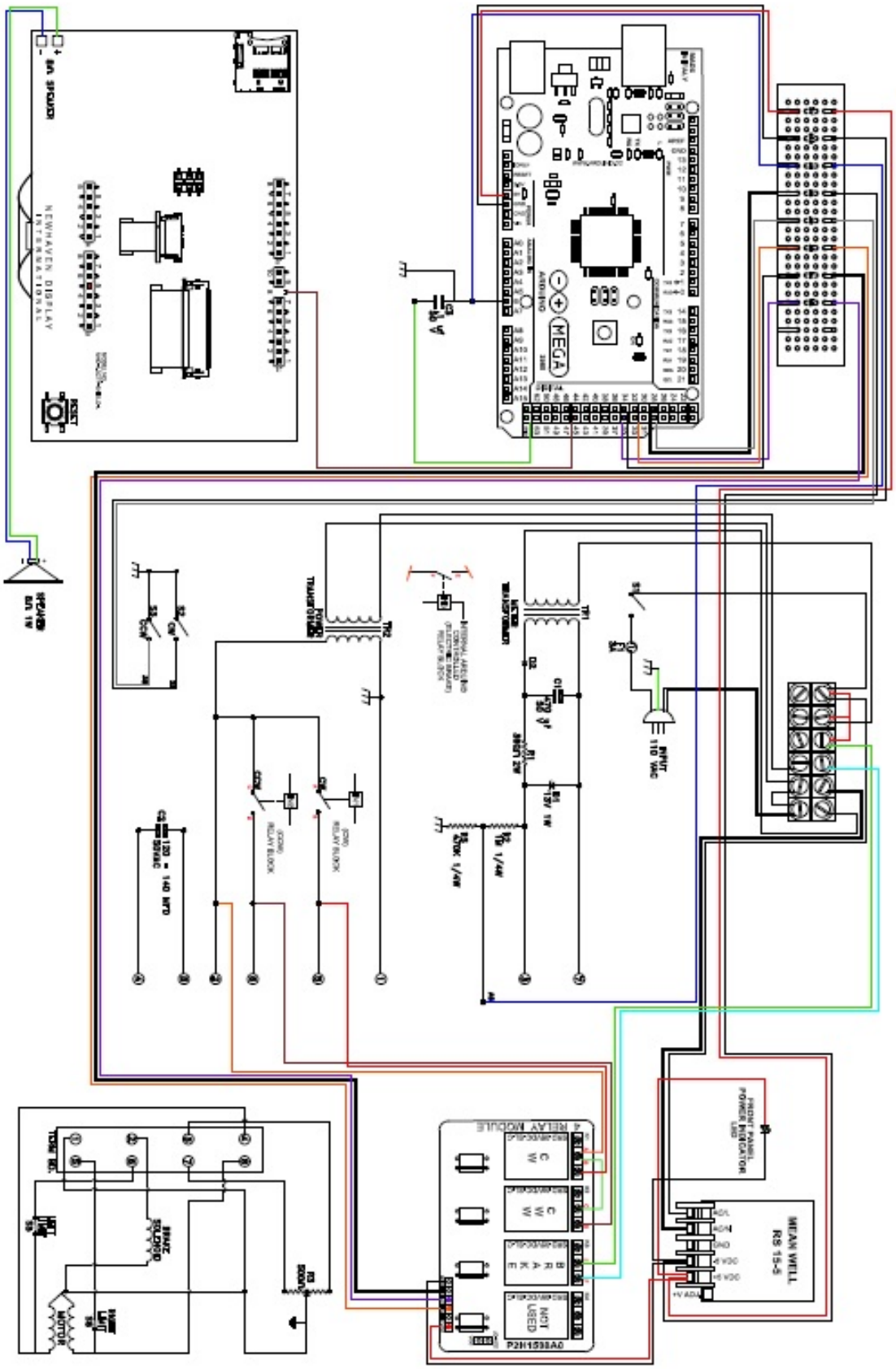
access the Menu:
-Tools: select Sound. Select the % volume of sound.

access the Menu:
-Tools: select RS232. Select if you want to have communication with the PC.
-Tools: select Baud. Select the Baud rate.
access the Menu:
-Tools: select VCC Arduino. Measure the working voltage of your Arduino and enter it in this section.

access the Menu:
-Limits: select Right and follow instructions.

access the Menu:
-Limits: select Left and follow instructions.

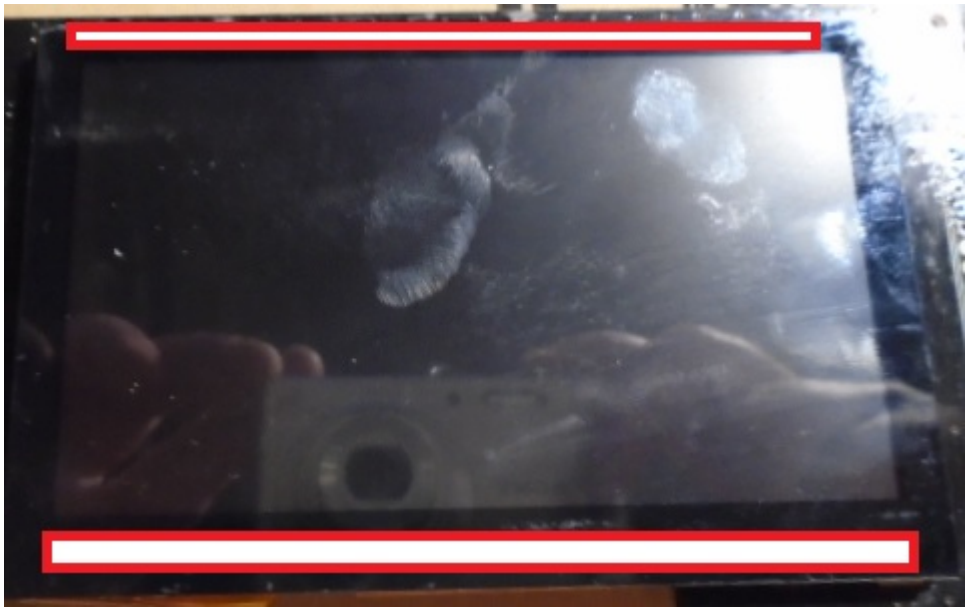
ASSEMBLY WITH NEWHAVEN SCREEN:



ASSEMBLY OF BUYDISPLAY SCREEN ON HAM AND FAMILY CONTROLS:

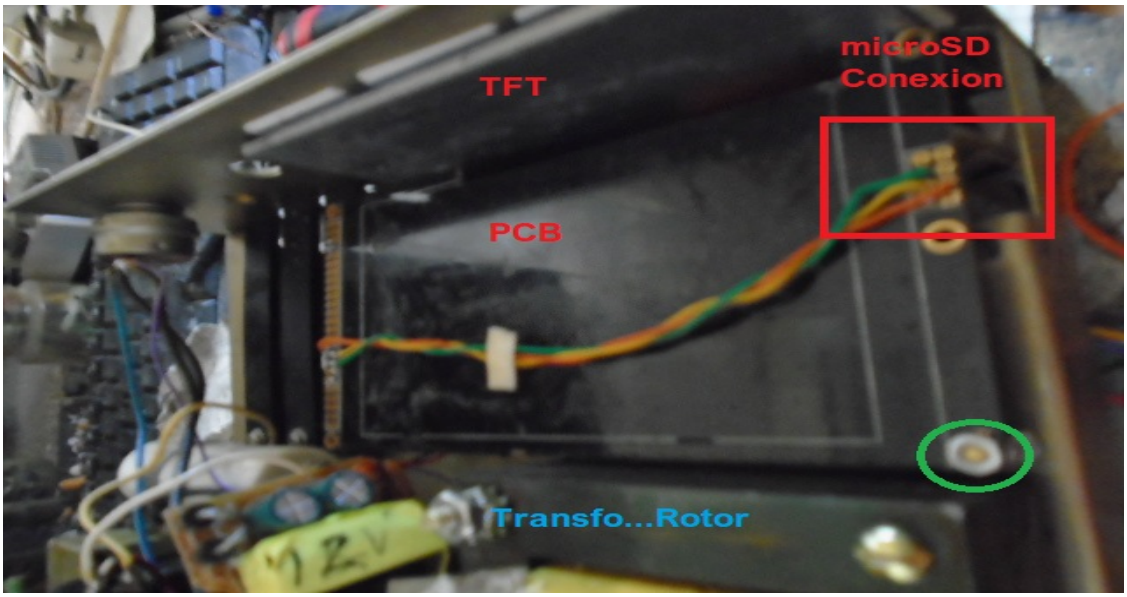
In the first place we will take the screen that we have received without sticking to the printed circuit. We will stick this with double-sided adhesive tape on the black part of the screen to the front of the control in the hole left by removing the meter and trim.

Placement of double-sided adhesive tape.



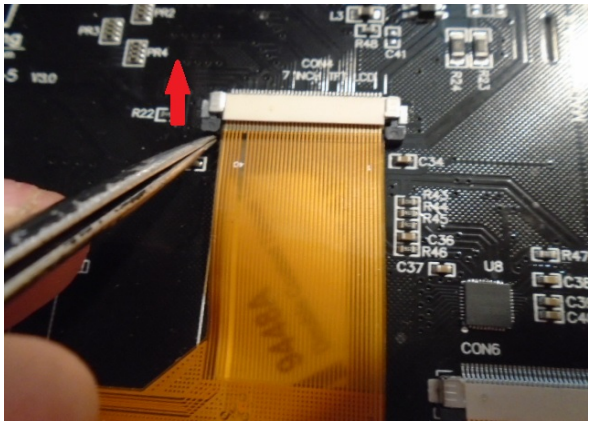
Placement of FPC/FFC flat cable extender plates.

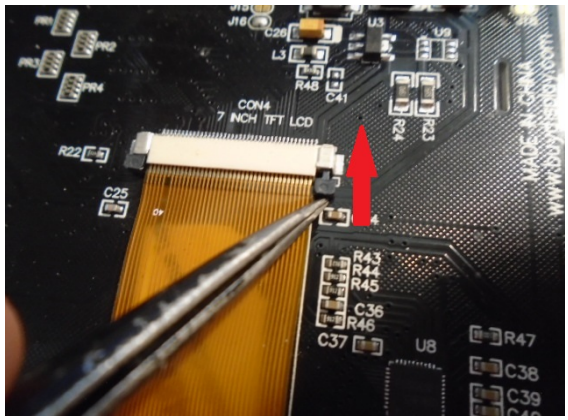
Placement of printed circuit board of the screen in the control:



The circle surrounded by green indicates the fixation of the printed circuit board of the screen to the control chassis. You should make a hole to fasten with a metric 3 (3mm) screw, taking into account that the circuit board is raised and does not touch the chassis of the controller. The wiring that you see in the photo is the connection of the micro SD card.

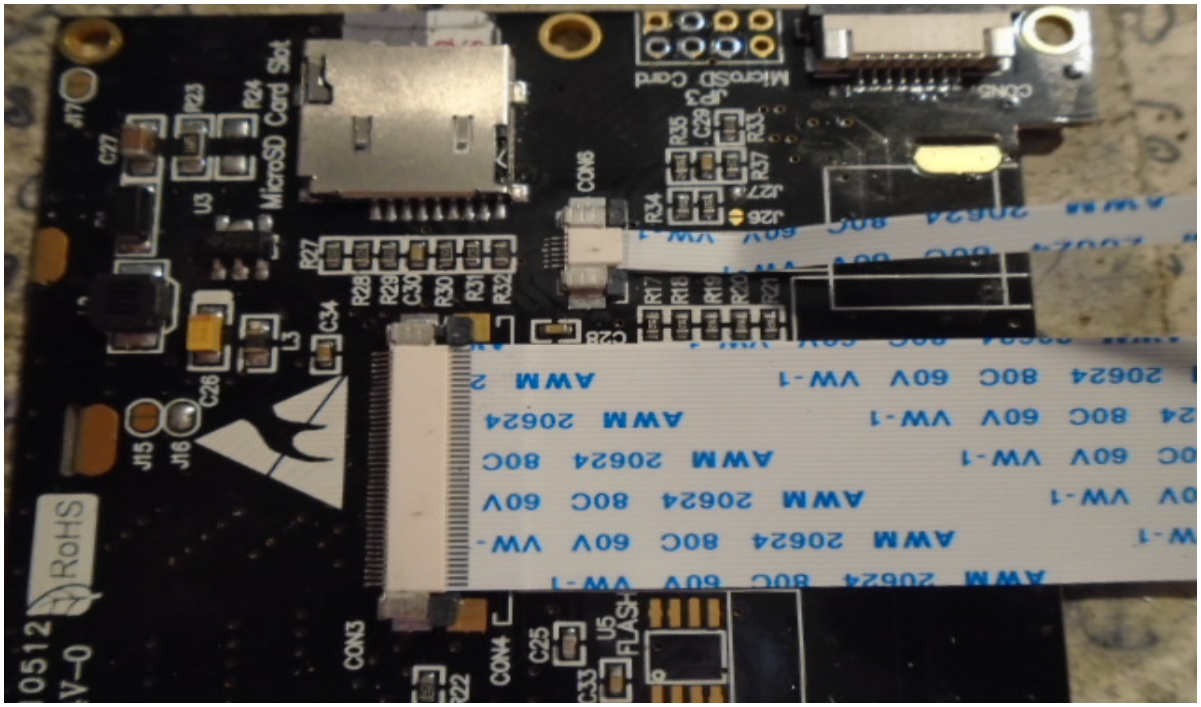
Once the screen and the printed circuit are placed, you must connect the flat cables from the TFT screen to the printed circuit board.
Once the flat cables have been inserted into the connectors on the printed circuit, you must push the studs to hold the cable.



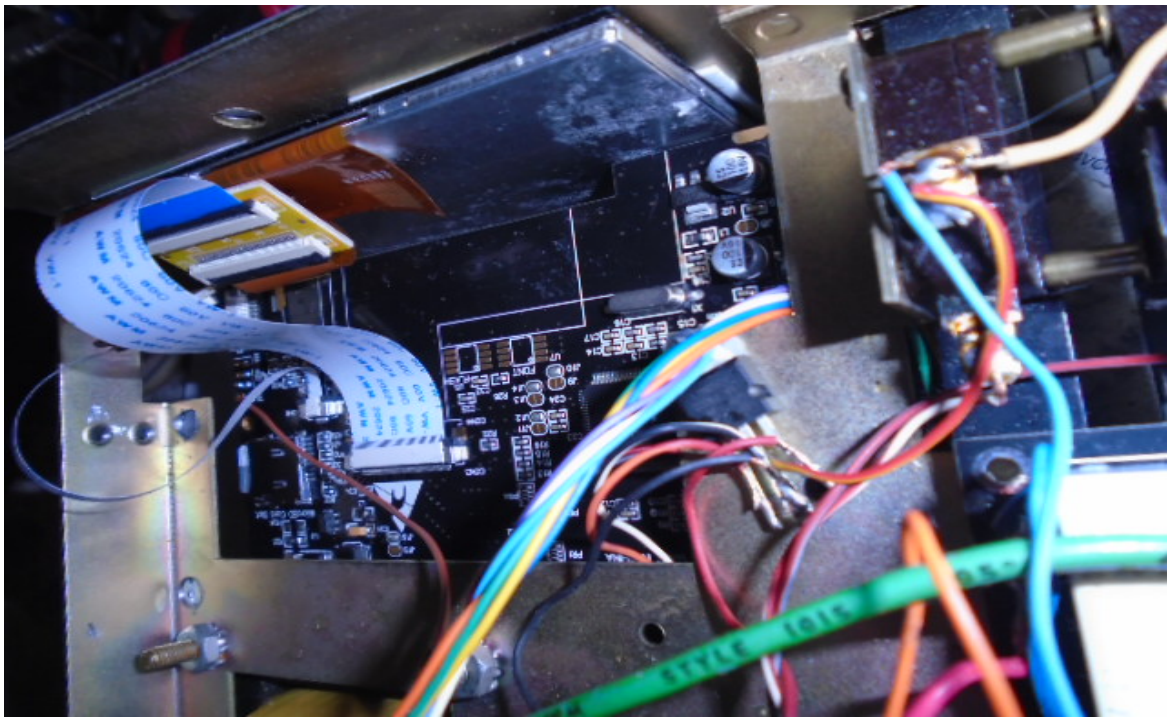


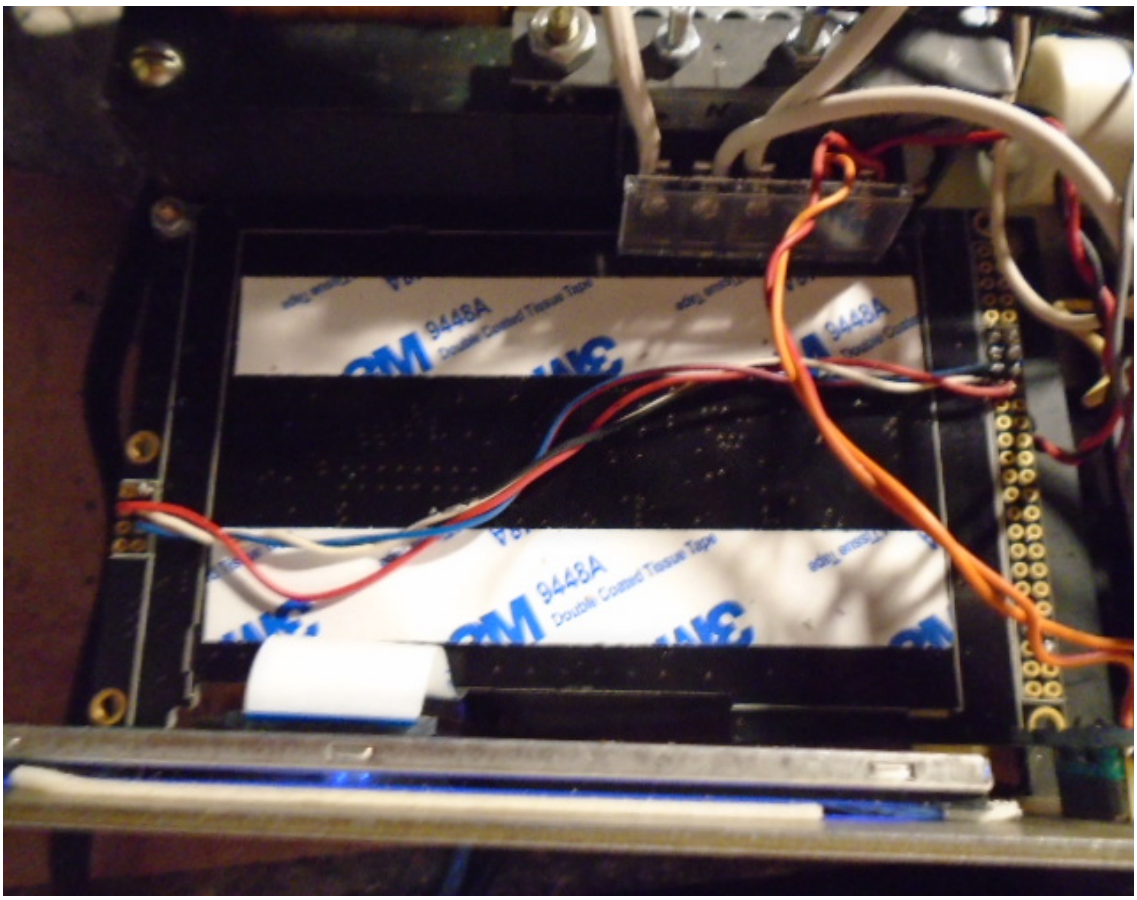
In the extension plates of the flat cable, you must open the black tab upwards, you must insert the flat cable and lower the tab so that it presses and leaves the cable attached.

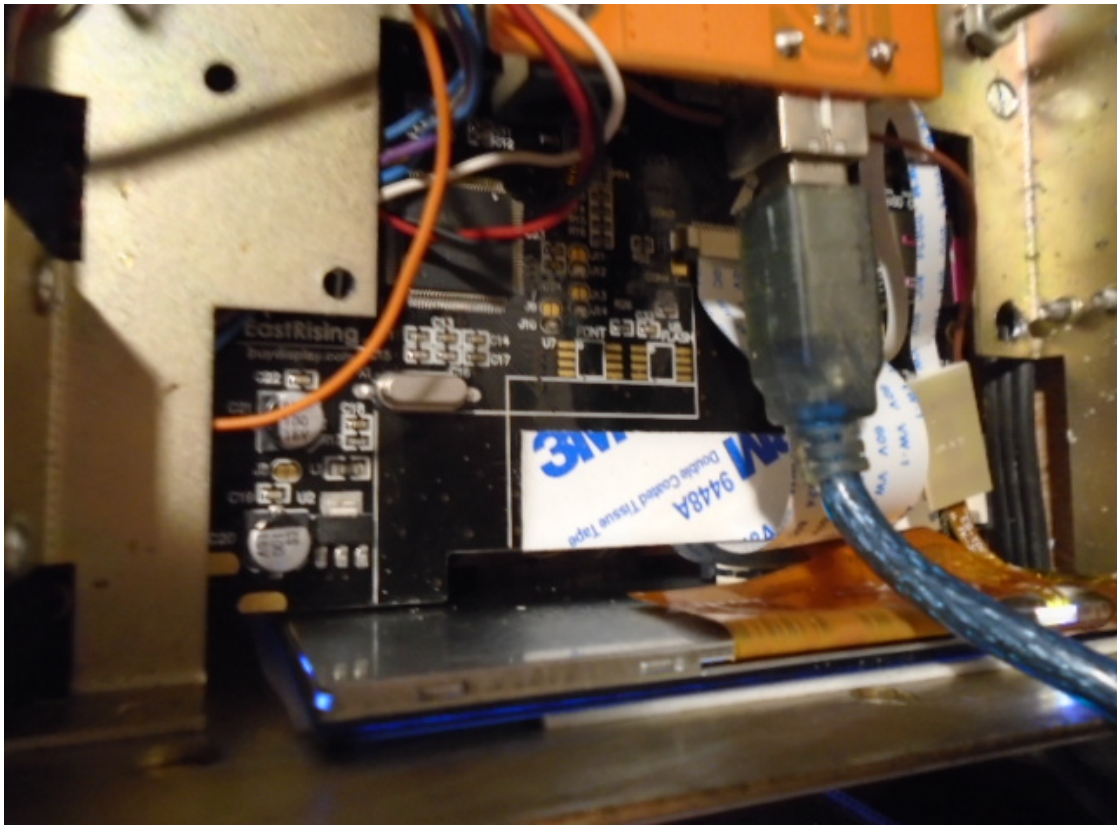
This is how the assembly should be with the flat cables, fixing the screen to the front and fixing the printed circuit board.



Result of placing the screen inside the HAM series control unit.






EastRising
3M
9448A
Double Coated Tissue Tape

Video Version 1.0: https://www.youtube.com/watch?v=tZQ_SATz8qU

Video Version 1.1: https://youtu.be/rb6bFKrHNz4

Video Version 1.2: https://www.youtube.com/watch?v=1q9Od6d1VrU

Video Version 1.3: https://youtu.be/N6pSJuTp1pE
https://youtu.be/eX_ByJIllYk

Revision 1.5

English manual revision: PA3VOS, Fokko Vos

EA7HG
Eugenio F.Medina Morales
23001 Jaén
España
Email : EA7HG@hotmail.com
WWW.EA7HG.COM