

Fibo-Box V3 with optocoupler board

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Introduction

The Fibo-Box V3 is designed to drive two 36V antenna motors and a 5V skew motor. This document assumes the two 36V motors used to steer the azimuth and elevation are equipped with limit switches that disconnect the power if a motor is at a maximum position.

The optocoupler board measures the voltage over the limit switches. So the limit switches are untouched for their original function (to disconnect the power). If a limit switch is switched, the voltage over the limit switch will be 36V. This voltage triggers the optocoupler board. The optocoupler board switches a switch on the Fibo-Box board. By this the Fibo-Box board knows a motor is at its maximum position.

Connection instructions

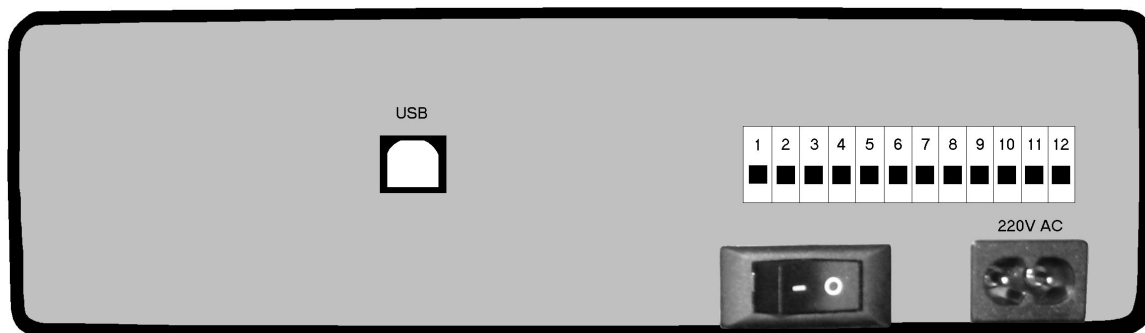


Figure 1: Backside of the Fibo-Box.

The motors and motor sensors are connected to the connection block. The numbers in the picture above correspond to the connection block in the schematic (see appendix).

1. 36V azimuth motor (motor side)
2. Limit switch sensor lead azimuth motor
3. 36V azimuth motor (limit switch side)
4. 36V elevation motor (motor side)
5. Limit switch sensor lead elevation motor
6. 36V elevation motor (limit switch side)
7. Pulse sensor azimuth motor
8. Pulse sensor elevation motor
9. Skew motor
10. 5V
11. Ground
12. Ground

Limit switches azimuth and elevation motor

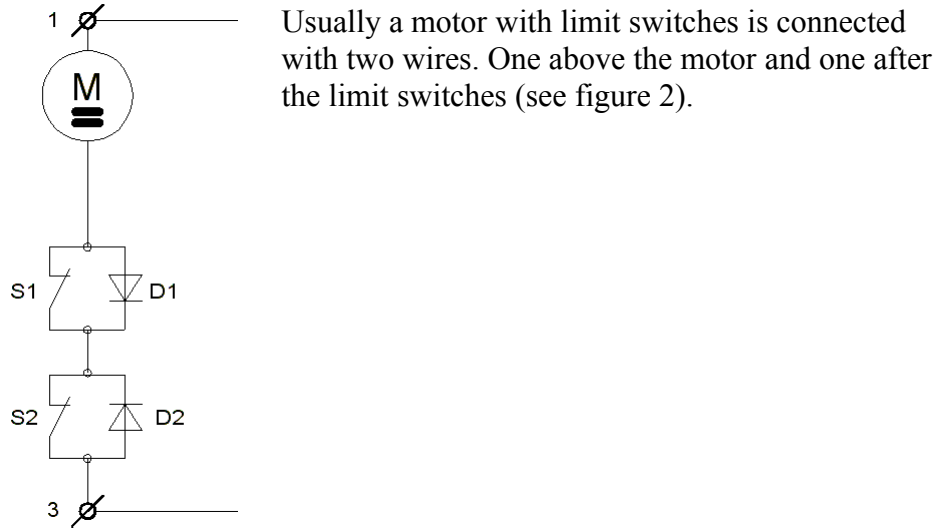


Figure 2

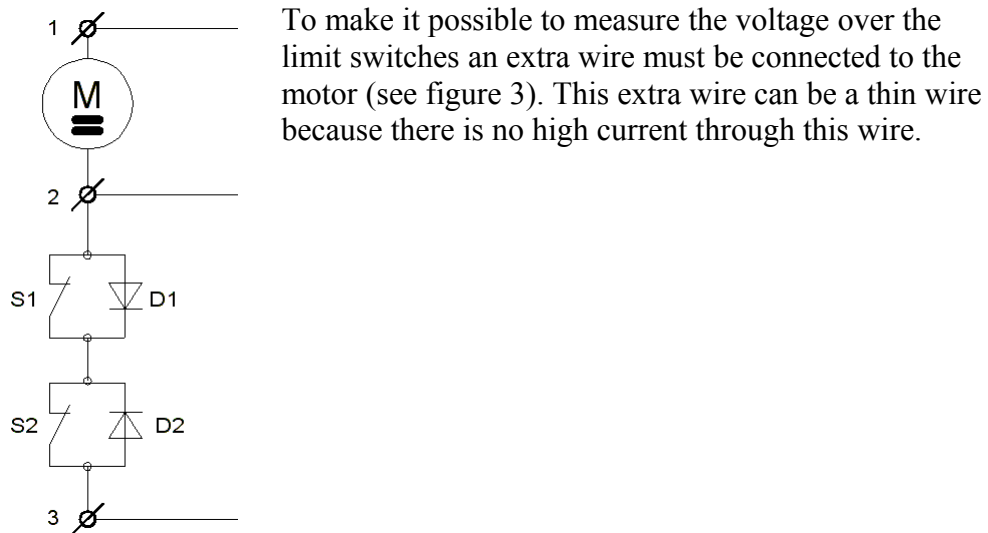
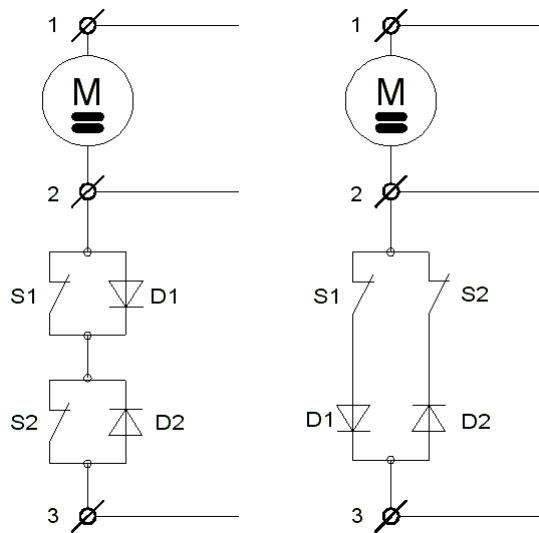


Figure 3



Limit switches can be connected in two different ways by the manufacturer of the motor (see figure 4). For the Fibo-Box it does not matter which option is used.

Figure 4

The voltage over the limit switches of the azimuth motor is measured on connection 2 and 3 of the connection block. The motor current to drive the azimuth motor runs through connection 1 and 3 of the connection block.

The same thing is valid for the elevation motor. The voltage over the limit switches of the elevation motor is measured on connection 5 and 6 of the connection block. The motor current to drive the elevation motor runs through connection 4 and 6 of the connection block.

Be sure each motor is connected in right order.

Motor sensor pulses

Usually a satellite dish motor is equipped with a sensor circuit. This can be a reed sensor, an optical sensor or a hall sensor. The basics of each sensor type is that at each pulse the sensor wire is connected to ground. Some sensors require 5V to operate others don't.

The motor pulse signal of the azimuth motor is connected to connector 7 and ground of the connection block. The motor pulse signal of the elevation motor is connected to connector 8 and ground of the connection block. The 5V voltage is provided on connection 10 of the connection block. Ground is provided on connection 11 and 12 of the connection block.

Skew motor

The Fibo-Box is capable to drive a 5V servo motor to adjust the skew. The skew motor is connected with three wires. These are a steering wire, 5V and ground. The steering wire is connected to connector 9 of the connection block. The 5V voltage is provided on connection 10 of the connection block. Ground is provided on connection 11 and 12 of the connection block.

Suppressing motor interferences

The Fibo-Box is a sensitive device. Motor interferences can cause the Fibo-Box to operate not properly. Therefore it is advisable to eliminate any motor interference. If a satellite dish motor is not equipped by the manufacturer with any suppressing circuit a simple method can be used to eliminate most interference. Connect a ceramic 47nF capacitor to each motor wire and ground (so you need two per motor) as close as possible to the motor. Connect a ceramic 100nF capacitor between the two motor wires. See figure 5.

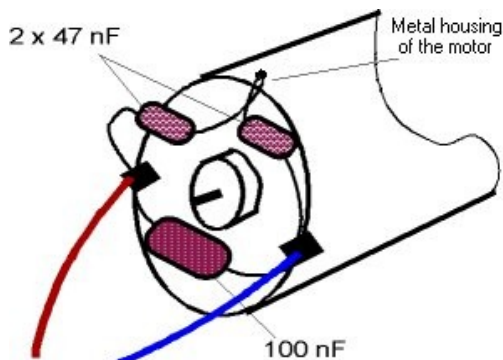
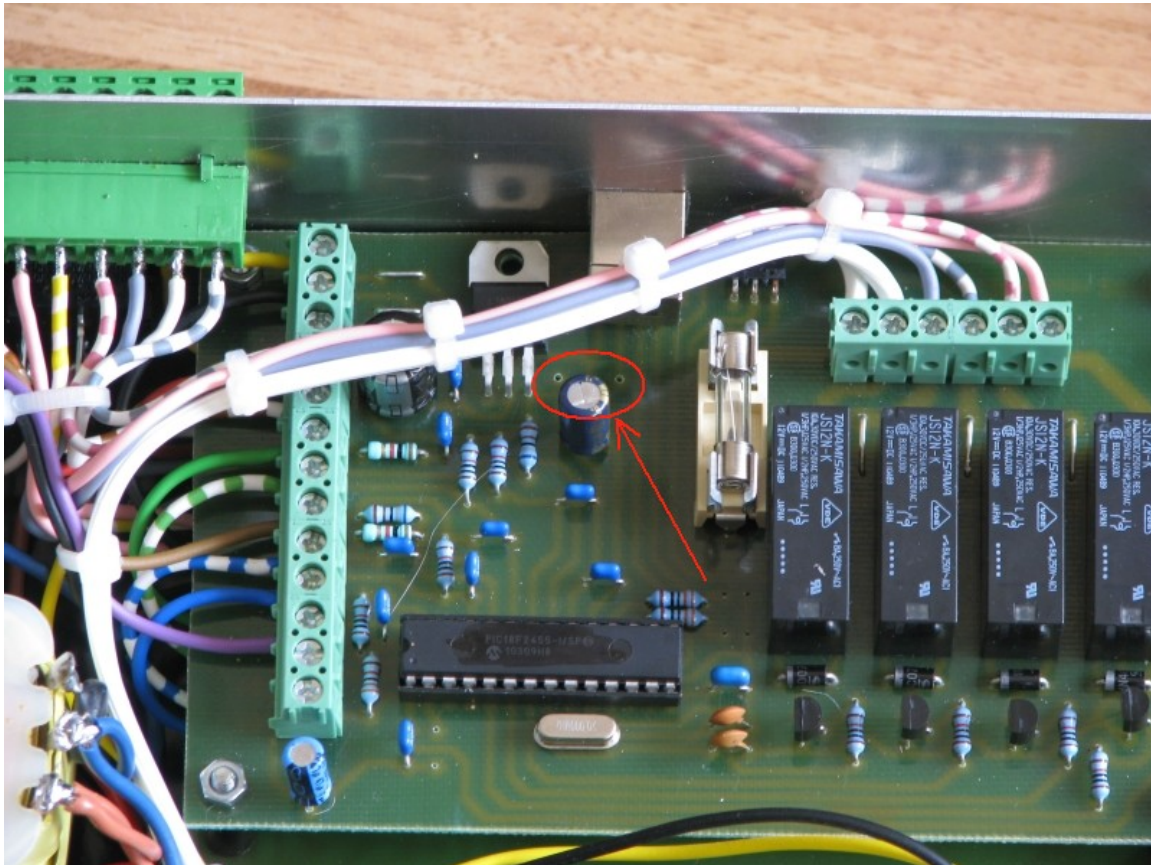


Figure 5

Using the power from the PC

It is possible to maintain power on the PIC18F2455 by using the 5V supplied by the USB port. Therefore diode D8 must be added on the Fibo-Box board. It is a personal choice to use the 5V supplied by the USB port (in fact 5V from the PC) or not. By default the diode is not present to maintain as much isolation between the PC and Fibo-Box as possible.



Diode D8 can be added just beside the power regulator.

First operation

When the Fibo-Box is fully connected and is ready for the first time operation the power can be switched on. Every time the Fibo-Box was disconnected from the power and after restoring the power back on the Fibo-Box drives the Azimuth, Elevation and Skew motor to the start position. The start position is maximum west for the azimuth motor and maximum down for the elevation motor.

Software installation

The Fibo-Box software is supplied on CD. Just copy the directory “fibobox” from the CD to a location of your own choice on your hard drive. You can even rename the directory “fibobox” if you like. The Fibo-Box software can not run directly from CD because the directory from where the software is ran from must be writable.

The Fibo-Box software can be started by executing Fibobox3.exe.

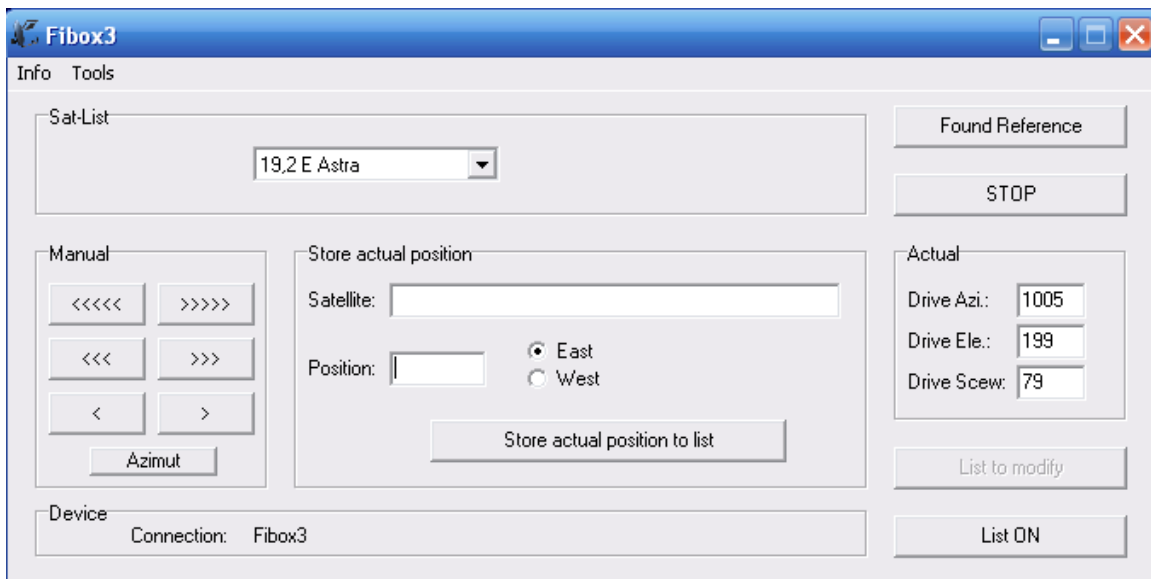


Figure 6

How to use the software

Behind the software is a database to store every position of all the satellites. To see the list of satellites click on the “List ON” button. To modify the list click on the “List to modify” button.

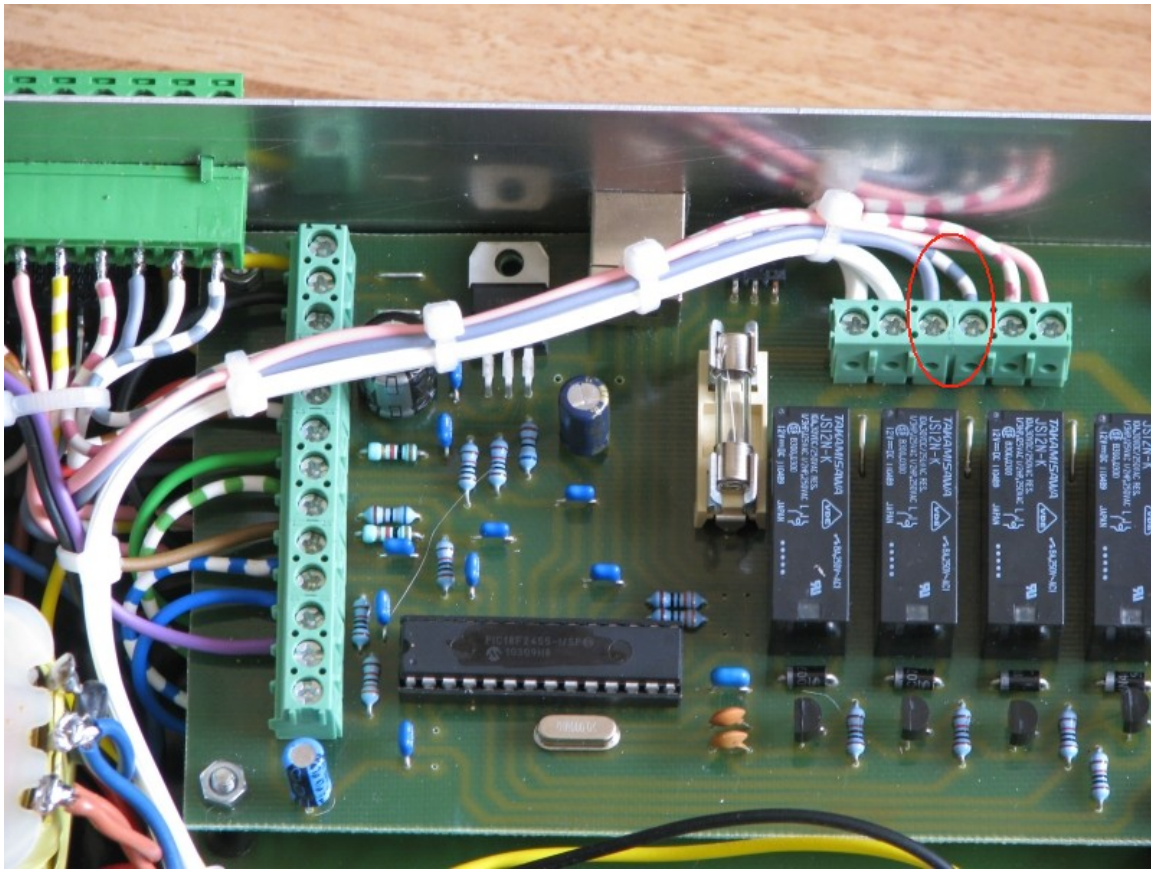
Every motor can be controlled with little steps by using the buttons in the “Manual” box.

When the satellite positions are set correctly in the database a satellite can be chosen from the “Sat-List” dropdown box.

Troubleshooting

I'm driving the azimuth motor to west, but the dish is turning to east. How can I swap that?

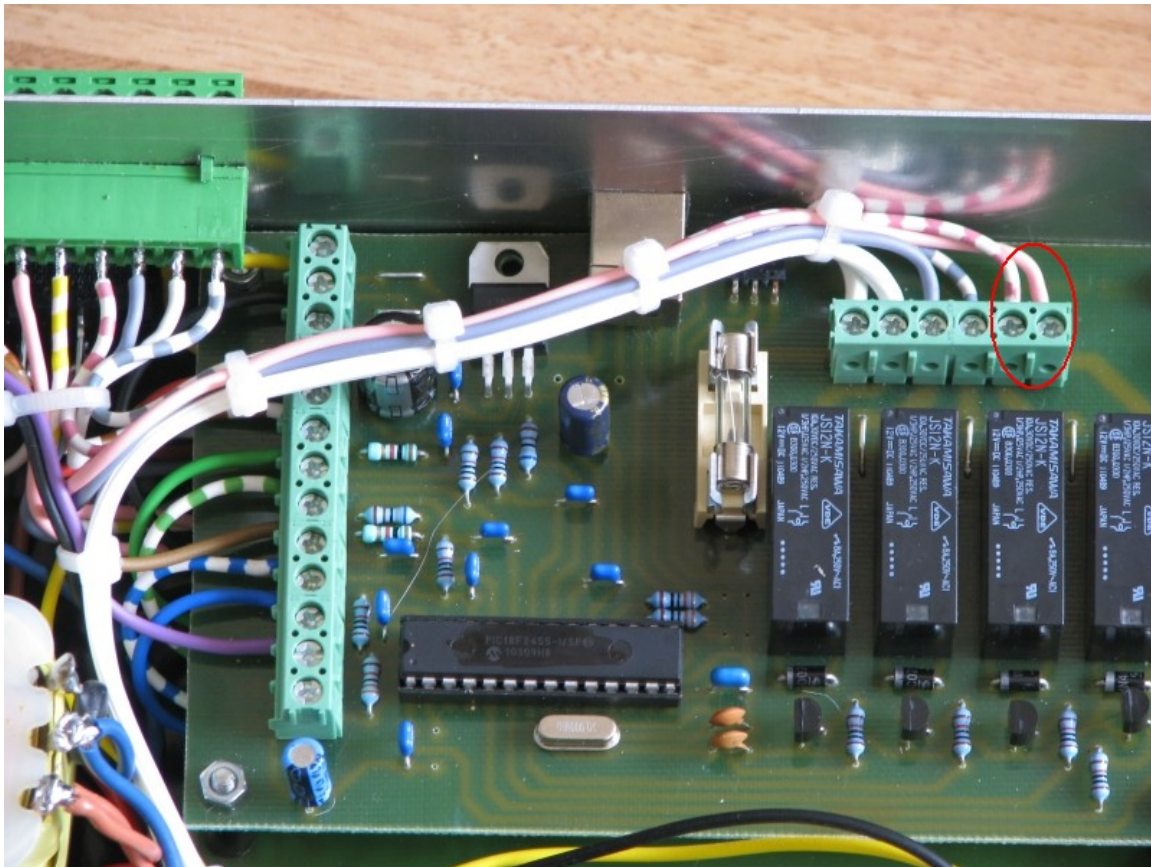
Not like the VBox2 the direction of motors can not be reverted by swapping the motor power wires. The direction can only be changed inside the Fibo-Box. Two wires need to swap places to revert the direction. Disconnect the power!!! Loosen the four screws to open the box. Locate connection 3 and 4 of the Fibo-Box PCB.



In the photo above connection 3 and 4 is where the grey and grey-white wire is connected.

I'm driving the elevation motor to up, but the dish is turning to down. How can I swap that?

Not like the VBox2 the direction of motors can not be reverted by swapping the motor power wires. The direction can only be changed inside the Fibo-Box. Two wires need to swap places to revert the direction. Disconnect the power!!! Loosen the four screws to open the box. Locate connection 5 and 6 of the Fibo-Box PCB.



In the photo above connection 5 and 6 is where the pink and pink-white wire is connected.

I have connected all the wires to the box and I am now ready for the first operation. When I start the box the azimuth motor is driving the dish to max west, but then nothing happens. All the buttons in the software are grey and not functioning.

Most likely the azimuth motor is not correct connected. The software is waiting for the limit switch of the azimuth motor before it can proceed with the next step of the startup procedure. The next step will be driving the elevation motor to the max down position.

I have programmed some positions into the Fibo-Box program and driving the dish from one position to another and then back to the first position. Sometimes it does not come back exactly to the position that I have programmed.

These kind of problems can be caused by motor interferences. Please read the chapter “Suppressing motor interferences”.

More information

More information can be found on <http://www.fibo-box.com>.

An other source with a lot of information about the Fibo-Box and motors is the forum dedicated to the Fibo-Stöp satellite dishes <http://www.fibo-owners.com>.