Tutorial AR Drone Miru Mod on Windows7 with DX6i, Part 1 **V1.9**
UFO Doctor, July 28th, 2011 revised Sept 6th, 2011

1. Introduction

The Miru Mod for standard remote control of the AR Drone is great work. Congratulations to Miru and thanks for the helpful advice!

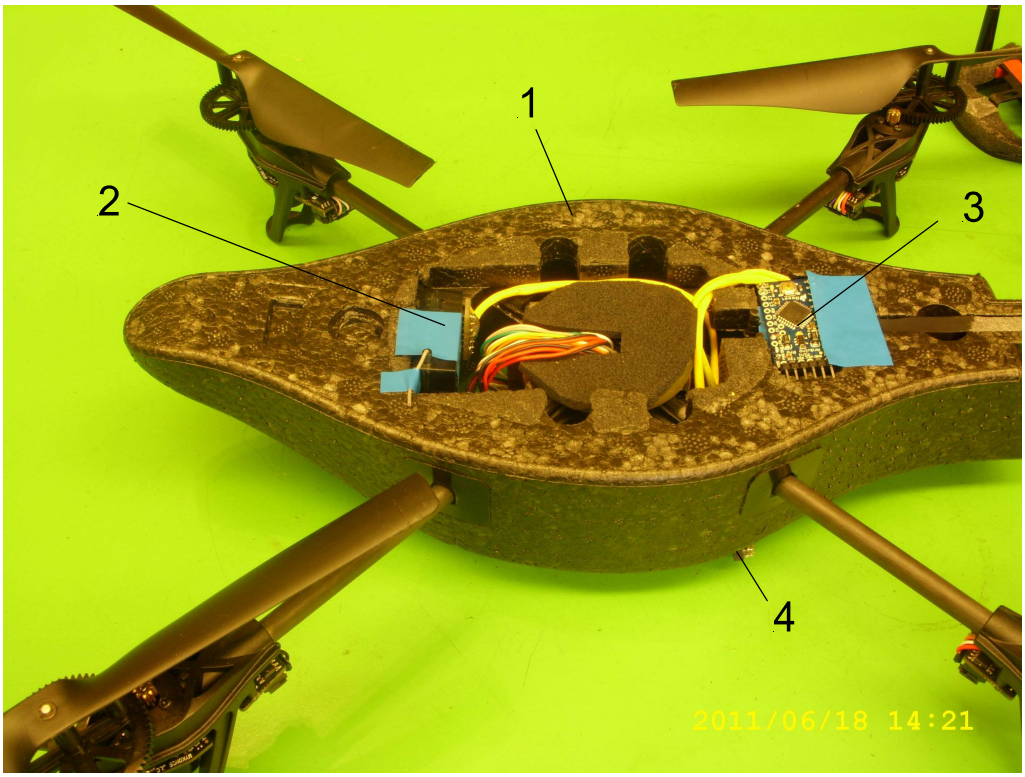


Fig. 1. Miru Mod setup in AR drone (here battery basket and cover plate removed)
1: AR drone; 2: RC receiver; 3: Ardunio Pro Mini ; 4: Connector to AR drone

Miru has helped me for a long time by private communication and I would like to share this information with you:

- Download the recent Miru information „drs006.zip“ from:
http://www.rcgroups.com/forums/showpost.php?p=18311773&postcount=260
Read and follow its readme!

- Download the Win7 terminal emulator from:
http://digitizor.com/2009/08/29/how-to-install-the-winxp-hyperterminal-client-on-windows-vista-or-windows-7-free/

- Check or update the software on your iPhone, e.g. with the app “FW manager”

FreeFlight	Firmware		Tab. 1. Software
1.6	1.4.6		The Miru Mod works with these settings. However, the iPhone video performance depends on your i-device!
1.6.1	1.4.7		
1.7	1.5.1	Video iPhone 3G ok!	
1.8	1.6.6	Video iPhone 4G ok!	

2. Material

2.1. Components from Sparkfun and Spektrum

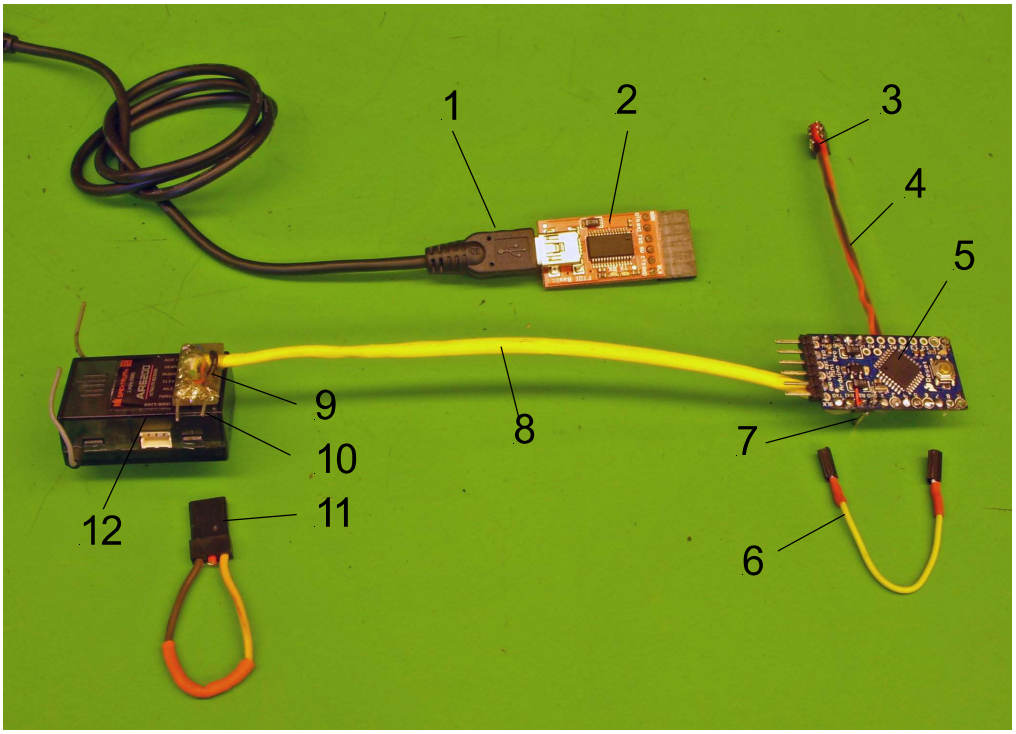


Fig. 2. Overview Miru Mod, airborne components 14.5 grams, 38mA@12V
1: USB Mini-B Cable; 2: FTDI programmer; 3: Drone plug; 4: Cable < 100 mm
5: Ardunio Pro Mini; 6: Setup test cable; 7: Header at Gnd and Pin 10 for setup test
8: Cable < 250 mm; 9: RC plug; 10: Bind contacts; 11: Bind plug; 12: Receiver

- RC-Transmitter Spektrum DX6i and Receiver AR6200 (or equivalent)
- DEV-09218 Sparkfun: Ardunio Pro Mini 328 - 5V/16MHz (not from somewhere else)
- DEV-10008 Sparkfun: FTDI Basic Breakout - 5V
- CAB-00598 Sparkfun: USB Mini-B Cable

2.2. Cables and connectors for RC, Drone and FTDI

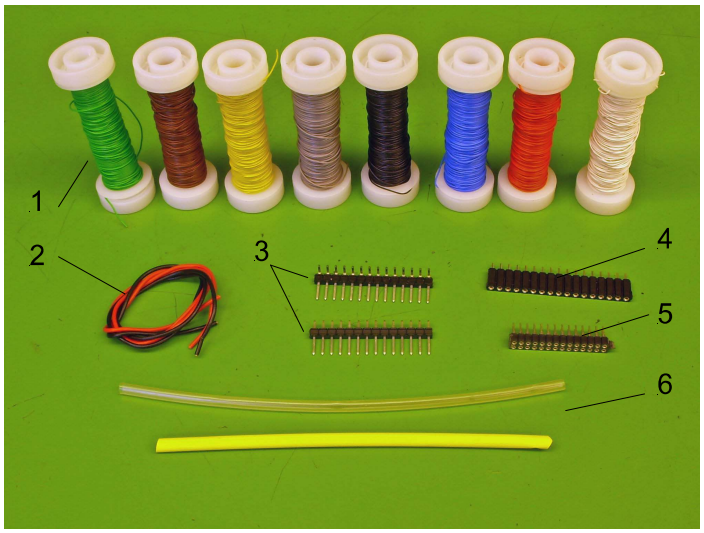


Fig. 3. Assembly material
1: Very thin flex cables to RC (from model railway shop)
2: Thin flex cables to AR drone
3: Header straight and 90 male
4: Header straight female
5: Connector female for drone serial port, e.g. 855-M22-7140442 www.mouser.com
6: Heat shrinking plastic tubing
Notes:
Cut the headers/connectors to the required lengths.
Thin cables you can get from an old PC mouse!

3. First test with Ardunio Pro Mini and FTDI

It could be that your Ardunio Pro Mini has a boodloader problem (I had this bad luck, one sample was ok, and the other sample from the same delivery was dead!)
So it makes sense to check first if your Sparkfun material works properly:

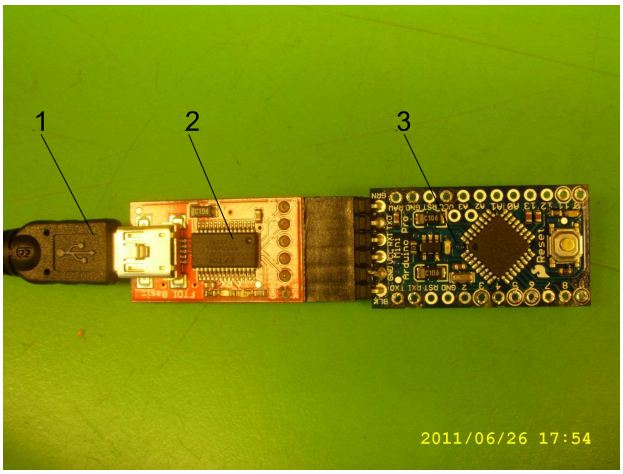


Fig. 4.
First test of the Sparkfun material
1: USB Mini-B Cable to PC
2: FTDI Basic Breakout 5V
3: Ardunio Pro Mini
Take care that the SMD components look upward before connecting!

Note:
If you have ordered your material not from Sparkfun but from somewhere else, you will probably run now in a severe problem! See Fig. 5

- Download now the Ardunio 0022 software from Internet:
  http://www.arduino.cc/en/Main/Software

- Connect the FTDI and the Ardunio Pro Mini to the PC by the USB Mini cable

- The red LED on the Ardunio Pro Mini should light, and the green LED should blink (if not, your game is over now, ask a good friend for help!)

- Open Controls, Device Manager and COM ports:
You should see: USB Serial Port (COM8) (or something similar!)

- Start Ardunio 0022
- Select “Tools”
  - Select “board”: Ardunio Pro or Pro Mini (5V,16MHz) w/ATmega 328
  - Select “serial port”: Com port xx (in our case: COM8)
- Select sketch
  - add file
  - select rx2atp.c (the downloaded Miru program!)
  - upload

- Observe the blinking LED at the FTDI; finally you should get the message:
  “Done uploading”

Congratulations, you are a very lucky programmer with the appropriate hardware material and you may proceed to the next steps.

(If you see error messages, please ask Google or a friend again for help, sorry!)

4. Connection of the Ardunio Pro Mini to AR Drone and Spektrum receiver

4.1. Circuit

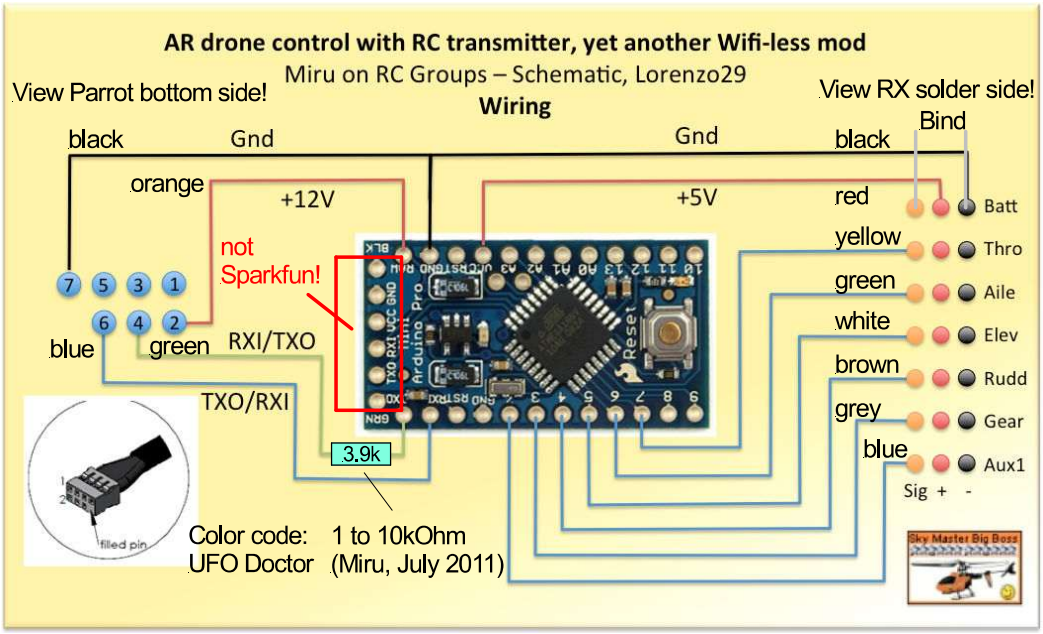


Fig. 5. Wiring by Lorenzo29 with comments by UFO Doctor and the Miru resistor from TX Ardunio to drone for better matching at less power consumption.
The uC picture is from http://www.arduino.cc/en/Main/ArduinoBoardProMini, but the Ardunio Pro Mini 328 - 5V/16MHz from Sparkfun shows inverted programming inputs!

4.2. Connectors

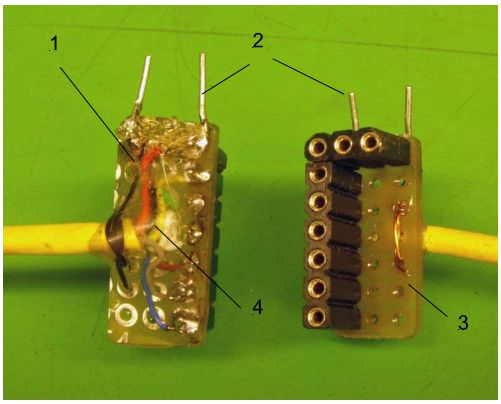


Fig. 6. RX-Connector
1: Connector; 2: Bind contacts;
3: Experimental Print; 4: Epoxy

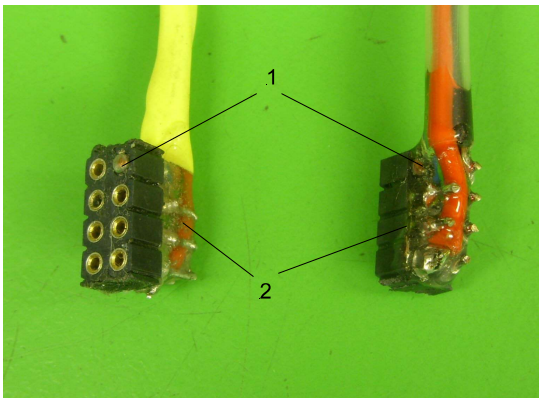


Fig. 7. Drone-Connector
1: This pin is blocked by soldering!
2: Epoxy

5. Preset the Spektrum DX6i transmitter for the binding procedure

Follow the manual of your DX6i transmitter and make the following settings:
Travel adjust throttle: -125% (minimum), Sub trim throttle: -100% (minimum)
Check on “MONITOR” that throttle is completely to the left with throttle stick down!
Keep your throttle stick completely down during the “Binding Procedure”
Finish the “Binding Procedure” before going to the next steps.

6. Set the Spektrum DX6i transmitter for flight conditions

- Reset Travel adjust throttle: +/-100%, Sub trim throttle: 0%
Check TRAVEL ADJUST:
THRO: +/-100%, AILE: +/-100%,
ELEV: +/-100%, RUDD: +/-100%
GEAR: +/-100%, FLAP: +/-100%,

Set and check REVERSE:
THRO-N AILE-R
ELEV-R RUDD-R
GEAR-N FLAP-N

7. Programming the Ardunio Pro Mini for DX6i (and for DX7i)

- Connect the Ardunio by FTDI (both prints with IC's upwards!) with your PC
- Start the program Ardunio IDE
- Select the right Com Port by checking Control Panel, Device Manager, here COM8
- Select the board "Ardunio Ardunio Pro or Pro Mini (5V,16MHz) w/ATmega 328"
- Select Sketch, add file, open file "rx2atp.c"
- **For DX6i only**: change the lines: #define S_LAND and #define S_FMOD as shown:

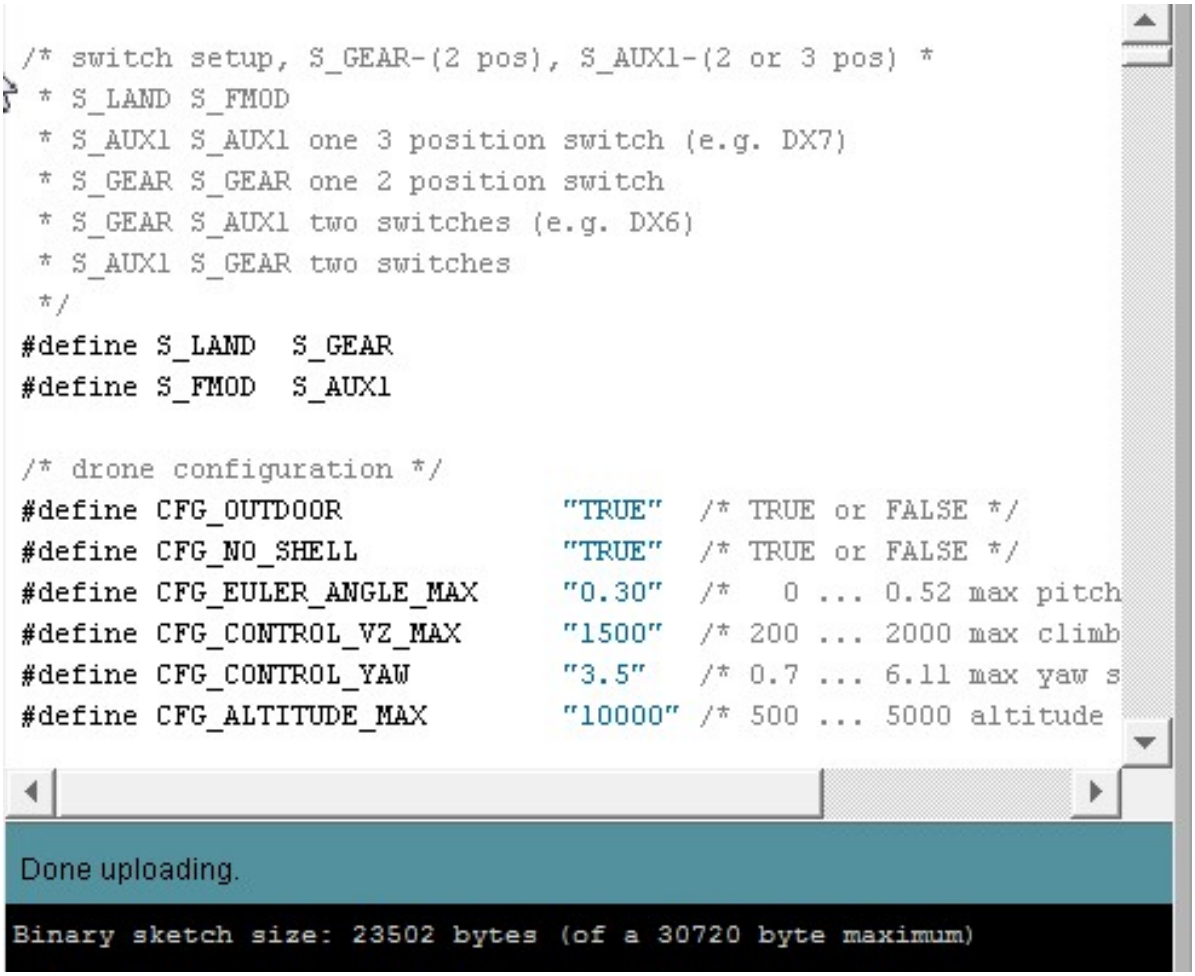


Fig. 8. Program "rx2atp.c" with changes for DX6i
- Upload the program and check if you get the message "Done uploading"
- Stop the Ardunio program now in order to disable the COM8 port.

8. Setup-test with HyperTerminal

- Ground the Pin labeled 10 (only now, not later!)
- Switch on the Spektrum RC transmitter, after 2 to 10 sec connect the USB cable
- Start the HyperTerminal monitor, make a new connection:
- Name the connection as you wish, e.g. Ard_COM8
- Select the same COM8 port as before (or check Control Panel, Device Manager)
- Set the monitor for 115200 Baud, 8 bits, no parity, 1 stop bit, no handshake
- Select Properties: Change standard setting: Emulation: select ANSIW
- **Type Ctrl B** (perhaps 2 times) and the terminal on your PC should look like this:

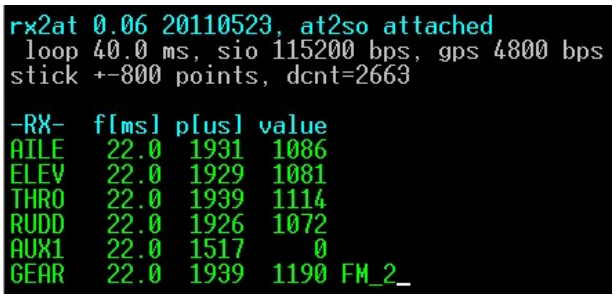
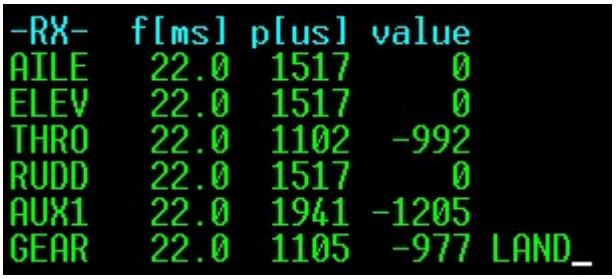
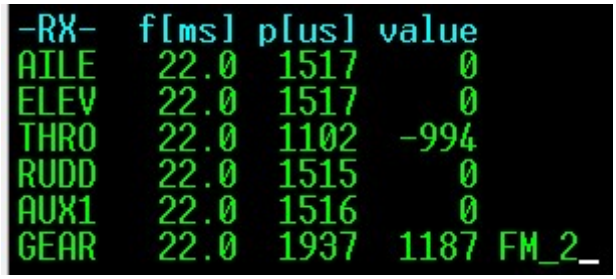


Fig. 9. Check the polarity of the RC Sticks: Positive values for :

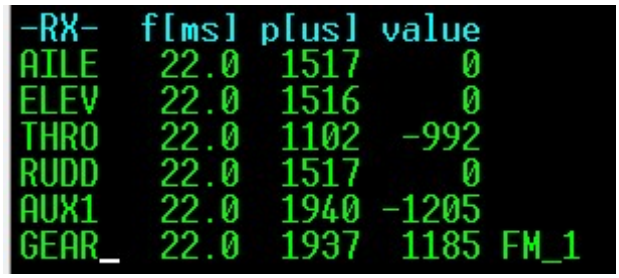
AILE	right
ELEV	down
THRO	up
RUDD	right
FLAP	down (0)
GEAR	up (F-Mode)



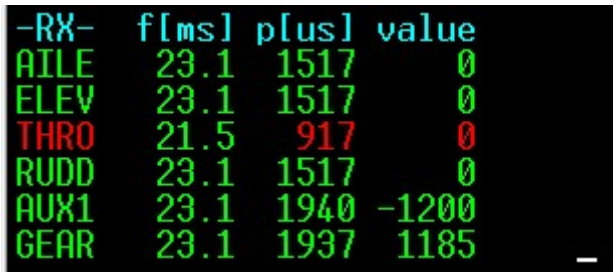
TX: Gear down, Flap 0 or 1:
Check if you see “LAND”



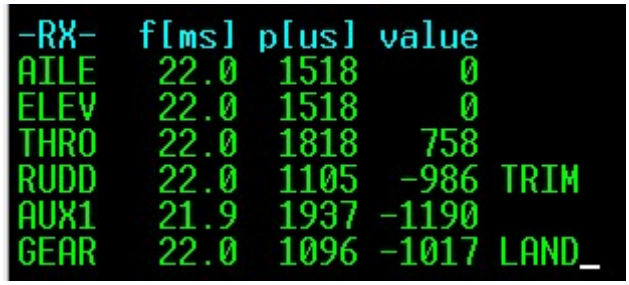
TX: Flight, Gear up, (F Mode), Flap 0,
Check if you see “FM_2”



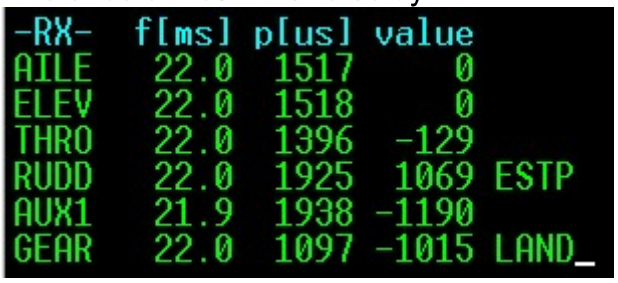
TX: Flight, Gear up, (F Mode), Flap 1,
Check if you see “FM_1”



TX switched off (OUT OF RANGE!):
Check if you see nothing at bottom right
This should mean “Land softly!”



TX: Gear down, Rudder to the left
Check if you see “Trim” and “Land”



TX: Gear down, Rudder to the right
Check if you see “ESTP” and “Land”

Ok? Continue now with Tutorial Part 2 about Miru Mod installation in your drone