Air Landing Gear controller and sequencer

SEQ1A

Users Guide

Plaza Pere Llauger, nau 18. 08630, **Canet de Mar**, **Barcelona**
E-mail: sales@xicoy.com. ☎ +34 93 794 27 74
web: www.xicoy.com

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Welcome!

Congratulations on the purchase of your new landing gear controller. Xicoy are dedicated to the design and production of electronic controllers to the highest standards of quality and reliability to bring you the customer the very latest next generation designs.

This device comprises two main sections that can be used independently:

- ✓ Pressure reading, failsafe and telemetry
- ✓ Sequencer.

Thus, is possible to use the pressure side only to read the pressure on telemetry or to activate an external sequencer, or to use only the sequencer section for other applications like canopy/pilot sequencing.

Features:

-Air pressure sensor capable up to 10Bar/145psi.
-Adjustable failsafe pressure.
-Transmission of the pressure by telemetry channel on Jeti, Multiplex and Futaba radios.
-SBUS compatible to save RC channel ports in the RX (Futaba)
-5 servo/Valve outputs (4 if telemetry used)
-5 Step sequencer. The state of each output is defined independently on each step.
-Individually Adjustable step time in 0,1s increments.
-Compatible with HV installations up to 10V.
-Easy programming trough the standard Xicoy data terminal.
-Small size and lightweight.

Installation:

Thanks the small size and lightweight of the unit, it can be placed in any place on the model. We recommend a place where the wiring be the shorter as possible to have a clean installation.

Working voltage is from 4,8V to 10V. All inputs and outputs share same supply; the power to the servos/valves will be taken from the RC input or telemetry input.

Electrical Connections:

Picture 1

From top to bottom on right side as per the above **picture 1**:

1. Output 1. This is the GEAR output, connect here the valve/servo that activate the retracts.

2. Output 2. First output for the doors.

3. Output 3. Second output for the doors.

4. Output 4. Third output for the doors.

5. Output 5 /Telemetry: Fourth output for the doors or telemetry output if telemetry is used.

6. RC Input: Connect to gear channel on the receiver. If SBUS is used, then this input transforms to the 4th door output.

7. Data terminal/computer connection.

Pressure sensor input:

Connect on the nipple at left side the hose from the air tank. Supplied as standard for a 3 mm OD hose. Available in option a nipple for 4 mm OD hose.

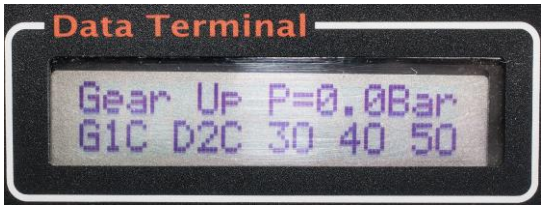
LED indicators:

Display the pressure in 4 different ranges. See "Led setup" section.

Setup and menu structure:

The unit is fully customizable using the Xicoy data terminal (HDT, SysAnalayzer ot Flight computer).

At power up, the status screen is displayed:



Picture 2

On the first line it is displayed the current air pressure on the right side and the status of the sequencer at left side.

The status messages could be:

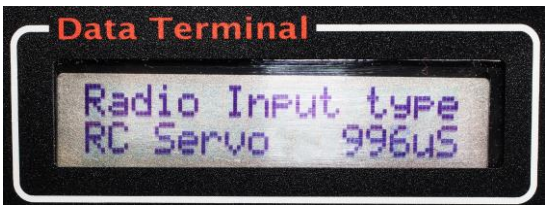
***Gear Up**:* The retract operation is completed. (**Picture 2**)
***Gear Down**:* The extension of the gear is completed.
***Step1, Step 2, Step 3**:* Intermediate steps of the sequencer.
***PresFail**:* Pressure below the failsafe pressure.
***InitOut**:* Power–up sequence in execution (see power-up options)
***ChkSwith**:* System not armed. Check the status of the retract switch.

On second line the current position of the 5 outputs is displayed.

G1: Output 1 (Retracts). C mean CLOSED (retracted) O mean opened (extended)
D2 to 5: Outputs 2 to 5 (Doors). C mean CLOSED and O mean opened .

Navigation trough the menus:

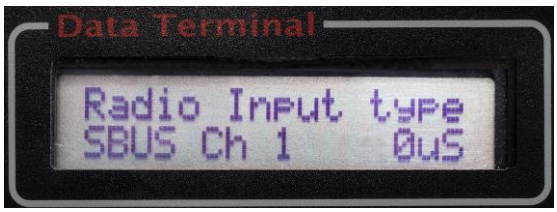
Use the left side buttons of the data terminal to change of menu, and use the "+" button to enter in the submenu.



Picture 3

Next screen displayed is informative and display the current readings from the receiver.

If a normal RC signal is used, it display "RC Servo" and the current reading received on RC In input. (**Picture 3**)



Picture 4

If Futaba SBUS is used (**Picture 4**), it displays the channel it is using (CH1 on the picture) and the current value read on this channel.

Picture 5

Next screens are used to setup options. Select the submenu you want to enter (indicated by an arrow) and click to "+" button to enter on it.

Sequencer setup:

The sequencer have 5 different steps, in each of them the positions of the 5 outputs should be defined. Each output is independent of the others and independent of the state of this output in previous step.

The time spent on each intermediate step can be defined in the "Sequence delay" output.

Before to program the sequence, it is recommendable to adjust the servo endpoints, annotate in a paper to which channel is assigned each door and then to draw the schedule of events.

Begin by defining the positions of the gear and doors at "Gear Up" position (usually all closed) and next the positions at "Gear Down" (Gear extended, some doors open and some closed).

Then decide the intermediate steps you need. If all 3, decide what door will open in step1, in which step the gear will be extended, etc. If you need less than 3 intermediate steps, then program the unused steps at same positions as previous step and assign half of the time to each of these steps.

Once you have a list of the positions of each output on each step, you can program the sequencer:

Picture 6

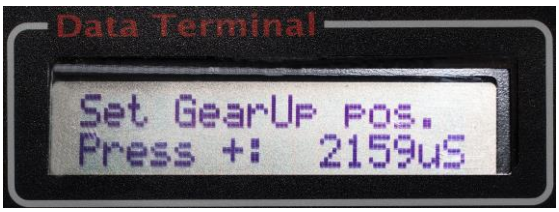
Using the +/- buttons you can select the step to be programmed.

Picture 7

Once the step selected, using the left side buttons you can select the output to be changed, then use the "+" button to toggle the output between the OPENED and CLOSED states. (**Picture 7**)

Radio Setup:

Always in a new installation, or after changes in the programing of your transmitter, it is necessary to align the sequencer to the radio. If you plan to use SBUS, first assign the SBUS channel you want to use on the "Telemetry Setup" section.



The transmitter is aligned in two steps. First set the switch on the TX on Gear Up position, and press "+" button to store the current reading, that is displayed on right side. (**Picture 8**)

Next set the switch on "Gear Down" position and click on "+" to sore the cuirrent setting. Please note that the reading should be different of at least 100uS from the "Gear Up" position. If the reading don't change when flipping the switch, then this mean that you have not assigned the switch to the RX output you are using.

Servo Position:

Picture 9

If you use servos for the doors or the gear, it is important to adjust the endpoints. This sequencer allows defining the OPENED and CLOSED position for every one of the 5 outputs.

Using the left buttons of the data terminal you can select the output and the position to be adjusted (output 1 and closed position on **Picture 9**. Use the +/- buttons to adjust the position of the servo.

WARNING: Once this menu is active, the servo will be activated as per adjustment to be done. Check that the servos are free to move before entering on this adjustment. It is recommended to connect only the output to be adjusted to prevent unwanted movements to other outputs while navigating through the menus.

Sequence delay:

The time spent on the intermediate steps can be defined individually in 0,1s increments.

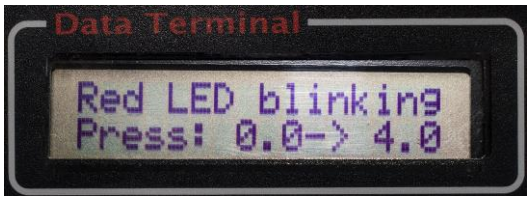
Use the +/- buttons to change the time on each step. (**Picture 10**)

Picture 10

LED Setup:

For normal use, a method of to check the current air pressure without the need of to connect the data terminal is provided by using two LED lights. The pressure where they are active can be defined in 4 sectors.

1) RED led steady: The pressure is below failsafe pressure. The failsafe pressure is defined in the Pressure menus.
2) RED LED blinking: The pressure is over the failsafe pressure but below the "Red blinking" pressure defined on this menu. Use the +/- button to adjust the threshold



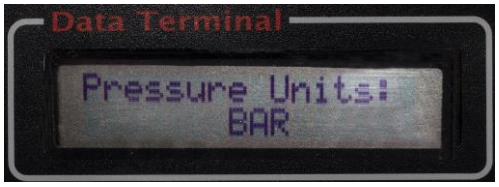
Picture 11

3) BLUE LED blinking: Pressure is higher than the "Red Blinking" pressure but below the "Blue Blinking pressure". Adjust this setting by the +/- buttons.
4) BLUE LED Steady: Pressure over the "Blue Blinking pressure".

For example, if you adjust the failsafe pressure to 3 bar, the "Red Blinking pressure" to 5 Bar and the "Blue Blinking pressure" to the pressure you fill the tanks, say 8 bar, then the LEDS will be RED when the failsafe active, blinking red when pressure low (between 3 and 5 bar in this example), blinking blue when pressure good)between 5 and 8 bar), and steady blue when higher than 8 bar, so you should fill the air tank until the blue led is steady.

Pressure Setup:

On this section you will be able to adjust all settings related to pressure sensor and calibrate it if necessary:



Picture 12

First you can choose the units using the "+" buttons. Options are BAR or PSI (**Picture 12**). This setting modifies the displayed units on all other menus, main screen and telemetry as well.

Picture 13

Next you can set the failsafe pressure, the pressure where you want that the system automatically deploy the gear in the case of air leak. Set to zero if you want to disable this functionality. (**Picture 13**)

Next two screens allow calibrating the pressure sensor if necessary. The calibration is done in 2 steps:

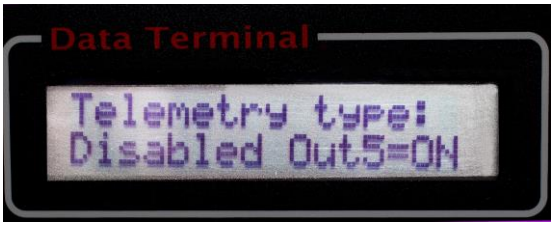
1) Zero reading: Disconnect the hose from the sensor and click on "+" button to "tell" to the system that the current reading from the pressure sensor is 0 bar/psi.
2) Gain: Connect the hose and apply air at a known pressure of more than 4 bar/60psi. Use the +/- buttons to adjust the reading to real pressure.

Always perform first the step 1!!!

***Note**: If using JETI telemetry, the unit will need to be registered again on the transmitter after performing the calibration.*

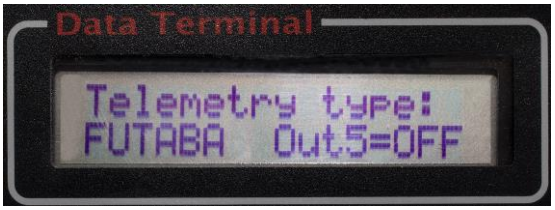
Telemetry Setup:

This unit can transmit the pressure reading trough telemetry to the transmitter on the ground. Currently it supports Jeti, Futaba. JR and Multiplex.



Picture 14

The telemetry output is shared with the output 5, so the outputs will be reduced to 4 when using telemetry, except in the particular case of SBUS. (**Picture 14**)



Picture 15

First screen on telemetry menus allows to enable the telemetry and to define the brand of radio. Clicking on the "+" button the different options are offered, together with the information about availability of the 5th output.

***NOTE**: After changing the telemetry brand or SBUS channel, the unit will reset automatically to reconfigure the outputs to the new brand.*

Each brand of radio has particularities and limitations:

JETI : The sequencer register itself correctly and is presented as "sequencer". It is possible to define an alarm of low pressure.

If used together with a Xicoy turbine telemetry adapter, both units can be connected using a "Y" lead, but the "JetiBox" functionality will be lost on both devices. If used with any other sensor, it should be connected using the *JETI telemetry expander*.

If the units are changed (bar/psi) the sensor should be re-registered again on the TX to display the correct units.

Multiplex : MPX radios don't have a sensor defined for pressure readings. The sequencer will display the pressure as Amperes when units set in Bar (2,5A for 2,5Bar) and milliamps when units set in PSI (60mA in place of 60psi).

The low pressure alarm can be defined on next screen, and the telemetry slot to be used on next. Take care to assign a free telemetry slot (not used for other sensors)

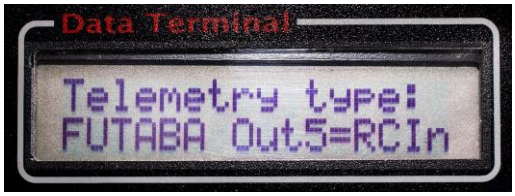
JR : Currently the JR radios show the pressure in hPa units, originally designed to measure the ambient pressure. Due to limitations of JR software, it is not possible to display the full range of pressure using hPa. Thus, if BAR units selected, 3.5 bar will be displayed as 3.5hPa on the TX. If PSI units selected, 45psi will be displayed as 45hPa.

Futaba : The range of different individual sensors on Futaba radios is very limited, so this unit emulates a single temperature sensor. Readings are presented in ºC. When the pressure units are set in Bar, 25ºC will be displayed for 2,5Bar. When units set in PSI 60ºC will be displayed in place of 60psi.

On next screen the telemetry slot to be used should be defined. Take care to assign a free telemetry slot (not used for other sensors).

SBUS support: If telemetry mode is defined as Futaba, then is possible to assign the SBUS channel to be used without the need to connect an output of the receiver to the RCIn input. Select the channel you want to use from 1 to 16. If 0 is selected, then the unit takes the Gear command from the RCIn input.

Once the SBUS channel is selected, then it is necessary to verify on the second screen that the command signal is present, and then adjust the radio settings as described on the radio setup section.



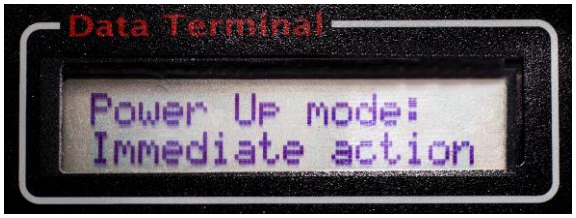
Picture 16

Using the SBUS to receive the gear command allows to free an receiver output for other use, and to free the RCIN input on the sequencer, in this case this connector reconfigures as an output for the 5th output of the sequencer.

Power Up setup:

It is possible to define the power up mode, the actions that the sequencer will do when powered up in 3 different options:

Immediate action: (Picture 17)



Picture 17

The outputs of the sequencer are set to the command received from the transmitter, whatever it is. This could cause the gear to collapse if the switch on the TX is mistakenly set to "gear up" position during power up.

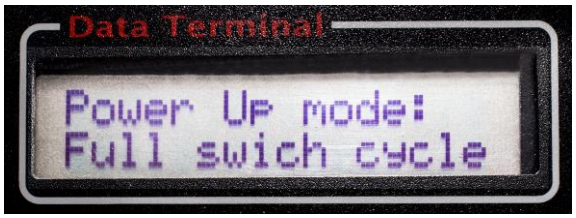
But can be useful in planes that need the system to be always pressurized due at not having mechanical locks.

Check gear Down: (Picture 18)

Picture 18

The sequencer checks for the "Gear Down" command. If the command received is "Gear Up", the system keeps in standby until the switch is set to Gear Down. Then it activates all outputs to "Gear down" positions.

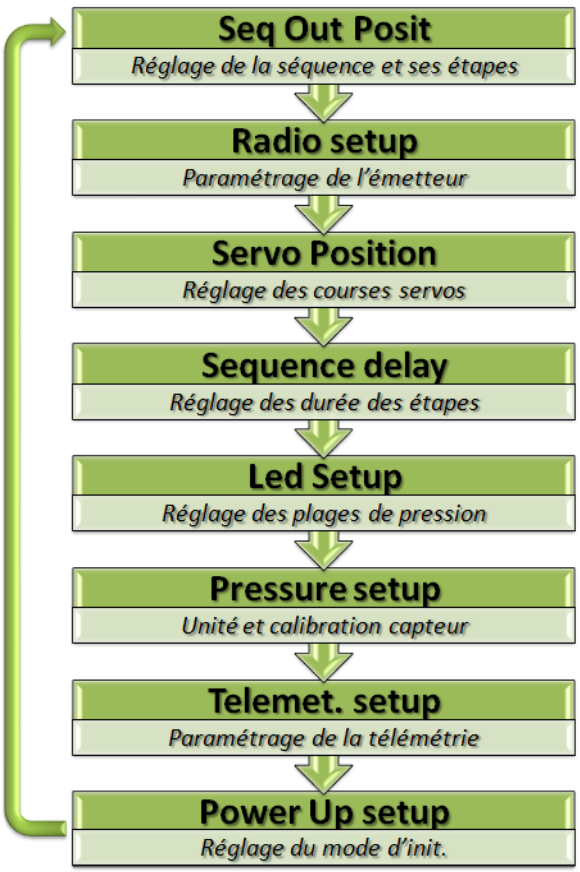
Full switch cycle: (Picture 19)

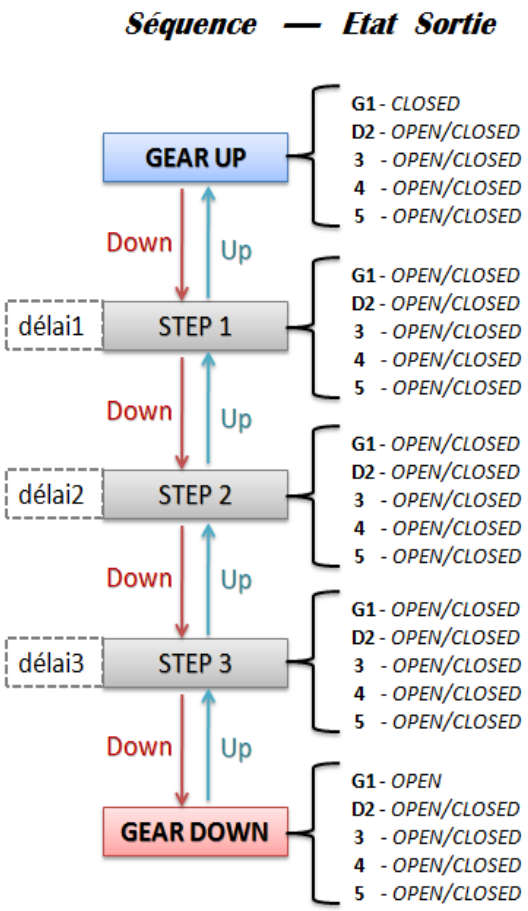


Picture 19

On this option, whatever is the command received, the units keep on standby until the switch is cycled to Gear Up and back to Gear Down again.

On all 3 modes, when the system is armed the outputs are set to Gear Down position, except the doors that are programmed to be closed in gear down position, that will be opened during few seconds to allow the gear to extend for the case it was retracted. After this time, the doors will be placed to the defined positions.





Disposal

Electrical equipment marked with the cancelled waste bin symbol  must not be discarded in the standard household waste; instead it must be taken to a suitable specialist disposal system.

In the countries of the EU (European Union) electrical equipment must not be discarded via the normal domestic refuse system (WEEE - Waste of Electrical and Electronic Equipment, directive 2002/96/EG). You can take unwanted equipment to your nearest local authority waste collection point or recycling centre. There the equipment will be disposed of correctly and at no cost to you.

By returning your unwanted equipment you can make an important contribution to the protection of the environment.