System Analyzer V1.3

Users Guide.

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Manual contents & design: Gaspar Espiell

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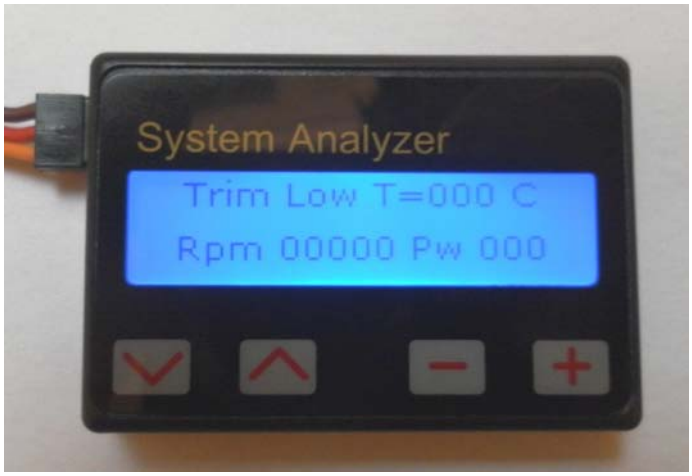
1. Specifications:

The System Analyzer is a multifunction tool that can be used as a miniature data terminal for Xicoy devices including FADEC ecus with servo lead connection, or to check several parameters in a typical radiocontrol installation.
The display is a graphical LCD module with blue backlight for perfect reading from total darkness to direct sunlight conditions.

When used as a data terminal, its functions are dependent of the device where it is connected (Ecu, processor, etc). In stand alone use, the system analyzer can measure and display several key parameter for to check the health of a typical radiocontrol system. It measures servo signals (pulse voltage, pulse width, pulse duration, frame rate, including graphical display of pulse shape) , RX battery voltage monitoring, recording the maximum voltage, minimum voltage and measuring time, plus providing a RX Battery voltage oscilloscope function, that graphically display of the variations of battery voltage, servo induced pulses, etc.

Weight: 25g (0.88oz) Size 55 x 38 x 12.4mm (2.17" x 1.5" x 1/2")
Voltage: 3 to 10V.

2. Using the data analyzer as a data terminal.



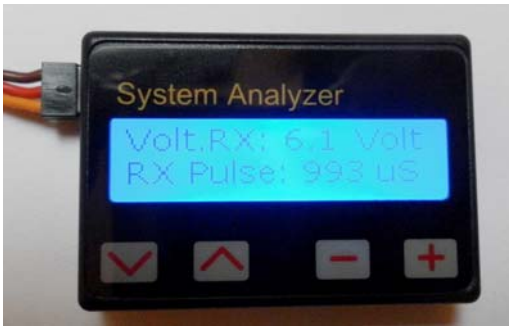
When the System Analyzer is connected to the data terminal port of a Xicoy device, it automatically detect the connection and work as a standard data terminal, all functions are those available on the device where it is attached.

However, extra functions are provided over the standard data terminal. One is the backlight, and the other is the possibility to analyze the battery voltage. To switch from data terminal mode to battery analyzer mode, press on the (-) button during 10 seconds. Refer to System Analyzer section for a description of the functions.

Note: Ecus of version 107K manufactured before 2012 provide a voltage supply to the data terminal port different from battery voltage, so this function can't be used on these ecus

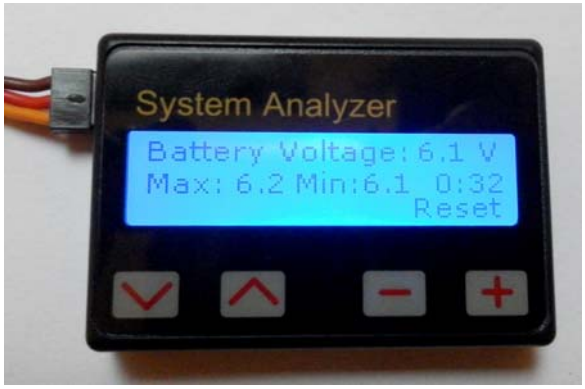
3. Data analyzer functions

When the system analyzer is connected to a receiver output where a standard servo signal is present, it power-up as a RC Analyzer mode.



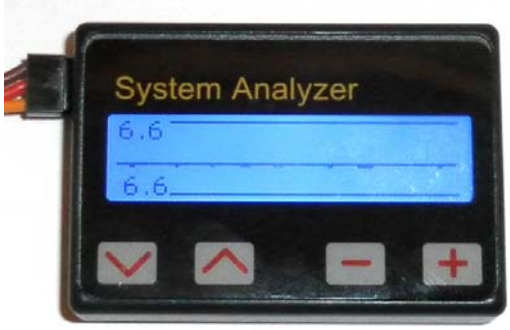
First screen displayed is the measure of the principal parameters, battery voltage and pulse width.

Trough the left side buttons it is possible to scroll trough the different screens.



Next screen provide the measure of the current battery voltage compared to maximum and minimum values recorded since the system had been powered on. A time counter that can be reset trough the (+) button show how long the system had been measuring the battery voltage. For example, if the analyzer is connected trough an ecu, it is possible after flight to check the maximum and minimum voltages read from battery. If there has been a glitch to the power that caused the system to reset, the time counter reflects the actual period analyzed that maybe shorter than full flight.

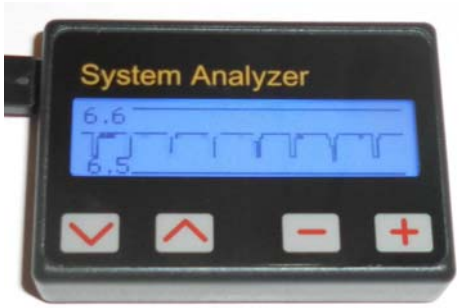
Oscilloscope function:



Next screen provides a graphical representation in real time of the stability of the battery voltage.

Picture on the right displays a typical steady battery voltage. Top line reading indicates the peak maximum voltage and bottom line indicate the minimum voltage, in this case same value, a perfect system, without voltage variations.

New test with same battery (LiFe 6.6V) but with a servo connected and loaded with a 2Kg weight. There are voltage variations due at servo “buzz”, but of a value about 0,05 V, voltage never goes close to 6,5V.

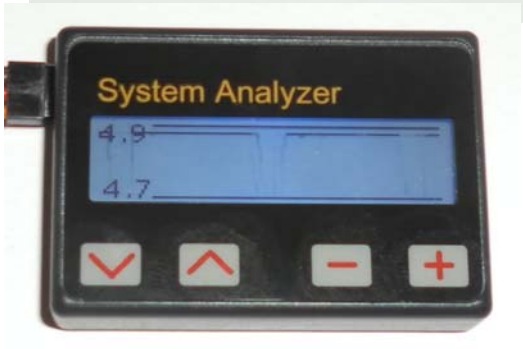


Same test and load, but in this case using an old and tired NiCd battery. Voltage variations are of about 0,3V, 6 times more than previous test. Voltage drops momentarily to 4,6V under load. A measure with a standard voltmeter would show the average voltage wich would be around 4,9V.

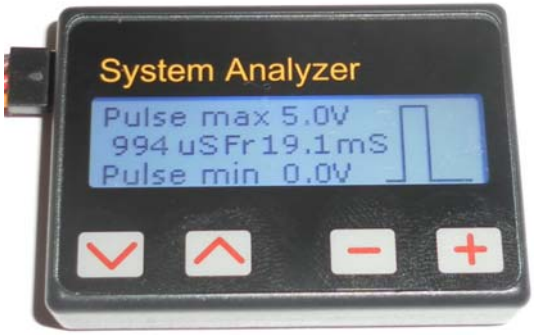
Trough the buttons + and – it is possible to modify the speed of the displayed data, making possible to analyze in detail slower or faster events.

On this picture the setup is exactly the same as above picture, but data is captured at slower pace, displaying more time (=more pulses) in the screen.

Again the same test setup but this time with a faster data capture. The pulses are bigger so it is possible to see the shape. Unfortunately the pictures don’t do justice to real display.



Servo signal quality measure:

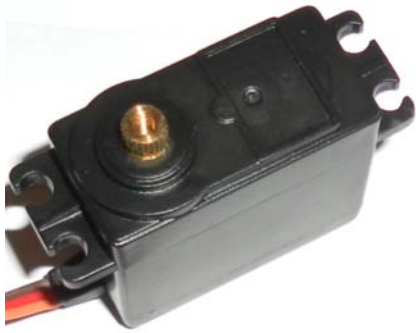


Last screen allow measuring the health of the signal that go to servos. The information provided is:

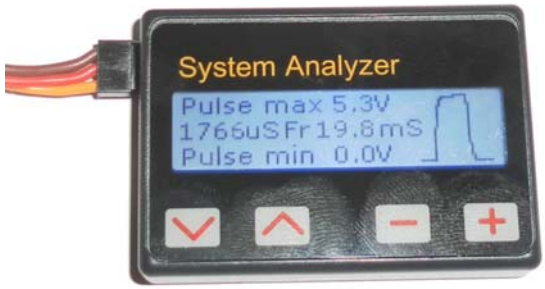
-Pulse width. Standard values are between 1000 and 2000uS, servo is centered at 1500uS. (994 in the picture).

-Frame rate, which is the speed that the pulse repeat. In this case each 19.1mS, about 50 times each second.

-Minimum pulse voltage. Should be 0V. A higher value means a bad connection on the ground line.
Maximum pulse voltage: It is the voltage that the pulse reaches. Old systems usually go to 5V, newer systems usually 3.3V, in some cases less. Low voltages could cause incompatibility with old servos.



-Graphical representation of the pulse shape. A "healthy" pulse is a square one, like the pulse displayed on the above picture; the analyzer was connected trough a "Y" servo lead in parallel to a quality servo. Servo signal doesn't change with or without the servo connected, meaning that we can connect more than one servo to same output.



As comparison, same test but with a cheap, low quality servo. The servo pulse appears distorted, no longer nice and square. A second servo connected in same output will not work correctly, as it will receive a distorted signal. Another brand low quality servo caused the signal to be reduced to a amplitude of 0,7V, a second servo in parallel didn't work at all.

It is possible to test the signal quality at several places (after receiver, after the battery splitter system, on long leads…But it is recommended to do the test with all devices connected, if you want to measure the signal quality that arrive to a servo, you should use a "Y" lead and "look" at the signal with the servo connected, to take in to account the influence of the servo itself.

Note:

This manual cover the software revision 1.3. Some of the features described here could not be available in previous versions, and, inversely, future software versions could have extra features added. At time of writing, we are working in to provide SBus support to count lost frames, failsafes, servo position, etc.