

Users Manual

G-Wiz LC/LC Deluxe 400/LC Deluxe 800

1.0 Overview

The G-Wiz LC and LC Deluxe are precision, state-of-the-art Flight Computers for model and high power rocketry. The G-Wiz LC is a low-cost, feature-packed computer comprised of an accelerometer, high performance RISC processor, and 2 high current pyrotechnic driver channels. The G-Wiz LC Deluxe has all of the features of the LC plus a third high current pyrotechnic driver channel and a barometric pressure sensor.

G-Wiz Flight Computers use proprietary firmware algorithms to determine the key events in a rocket's trajectory. The key events monitored are:

- launch
- booster burn-out
- sustainer ignition (when applicable)
- sustainer burn-out (when applicable)
- coast,
- apogee
- low altitude

G-Wiz LC, when used with proper pyrotechnic charges, can light a cluster of motors or a second stage motor and deploy a single parachute at the apogee of a model or high power rocket's flight. Peak inertial altitude is flashed out, on the Status LED, at the end of flight.

G-Wiz LC Deluxe, when used with proper pyrotechnic charges, can light clusters or perform staging, deploy a drogue or main parachute at apogee, and optionally deploy a main parachute at 400' or 800' feet AGL. Peak barometric pressure altitude is flashed out, on the Status LED, at the end of flight.

2.0 Specifications

Parameter	LC	LC Deluxe 400	LC Deluxe 800
Max. Acceleration	+/- 50 g	+/- 50 g	+/- 50 g
Max. Barometric Altitude	-	35K feet MSL	35K feet MSL
Number of Pyro channels	2	3	3
Maximum continuous current per Pyro channel	8 Amps	8 Amps	8 Amps
Number of batteries required	1 or 2	1 or 2	1 or 2
Recommended Battery	9 VDC transistor battery (Duracell MN1604)	9 VDC transistor battery (Duracell MN1604)	9 VDC transistor battery (Duracell MN1604)
Max. voltage applied to Flight Computer (terminal block pins 7 & 8)	15 VDC	15 VDC	15 VDC
Computer current consumption	8mA typ.	16mA typ.	16mA typ.
Max. Pyro channel voltage	60 VDC	60 VDC	60 VDC
Pyro channel test current (9VDC battery)	3.5mA	3.5mA	3.5mA
Pyro channel firing time	1 second	1 second	1 second
Pyro channel functions	1: Stage/cluster, 2: Apogee parachute deployment	1: Stage/cluster, 2: Apogee parachute deployment 3: Low altitude parachute deployment	1: Stage/cluster, 2: Apogee parachute deployment 3: Low altitude parachute deployment
Low Altitude Pyro channel activation	-	400' feet AGL +/- 80 feet	800' feet AGL +/- 80 feet
Altitude readout	Flashing LED (Status LED) Inertial Altitude	Flashing LED (Status LED) Barometric Altitude	Flashing LED (Status LED) Barometric Altitude
Number of LEDs	1 Status LED 2 Pyro Continuity LEDs	1 Status LED 3 Pyro Continuity LEDs	1 Status LED 3 Pyro Continuity LEDs
Main Battery Life (with separate Pyro Battery)	40 hours	20 hours	20 hours
Operating Temp. Range	0-70°C	0-70°C	0-70°C

3.0 Cluster/Staging Configuration

Cluster motor ignition or second stage ignition is selected via the 2-pin jumper, JP2. When configured for staging (JP2 open), LC or LC Deluxe will fire Pyro channel 1 upon detection of booster burnout. The status LED will blink two short flashes in succession followed by a pause, when configured for staging.

NOTE: The Cluster/Staging Configuration jumper is read by the microprocessor ONLY at power up. Changing the jumper position after power-up has no affect.

When configuring for cluster motor ignition (JP2 shorted), remember to allow G-Wiz to fire the smaller motor(s). G-Wiz LC or LC Deluxe will fire Pyro channel 1 upon detection and confirmation of launch state. Detection and confirmation occurs approximately 0.5 second from first movement of the rocket. The status LED will blink one short flash followed by a pause, when configured for cluster ignition.

Example: When clustering three J's with an "M", light the "M" with the ground-based launch control system. Allow G-Wiz LC or LC Deluxe to light the 3 "J" motors.

JP2 Jumper -In/Out	Function	Status LED flashes
Out	Stage	2 flashes
In (default)	Cluster	1 flash

4.0 JP1 Terminal Block Wiring

Terminal block, JP1, allows the user to quickly connect the leads from Pyro charges to the G-Wiz LC or LC Deluxe Flight Computer. The two wires from a pyro charge or squib are connected between a Pyro Channel's '+' and '-' terminals on the JP1 terminal block. Care should be exercised when connecting the battery leads to the terminal block to avoid polarity reversals.

The factory-installed jumper from JP1 pin 5 to JP1 pin 7 supplies power to the flight computer, under normal operation. When using the high current configuration, this jumper must be removed. You **must** use two separate batteries when using the high current configuration. This prevents power to the computer from being contaminated by glitches in the pyro power. When using the high current configuration, the jumper from JP1 pin 5 to pin 7 **must** be removed. Failure to remove this jumper, when using the high current configuration, can result in damage the LC/LC Deluxe Flight Computer and void the warranty.

All of the Pyro channel outputs are open drain outputs. Terminal block pins 1, 3, and 5 are common. They are provided to ease the wiring of Pyro charges to the Flight Computer. The "-" (minus) side of each Pyro channel is connected to the drain of a high current, n-channel, power MOSFET.

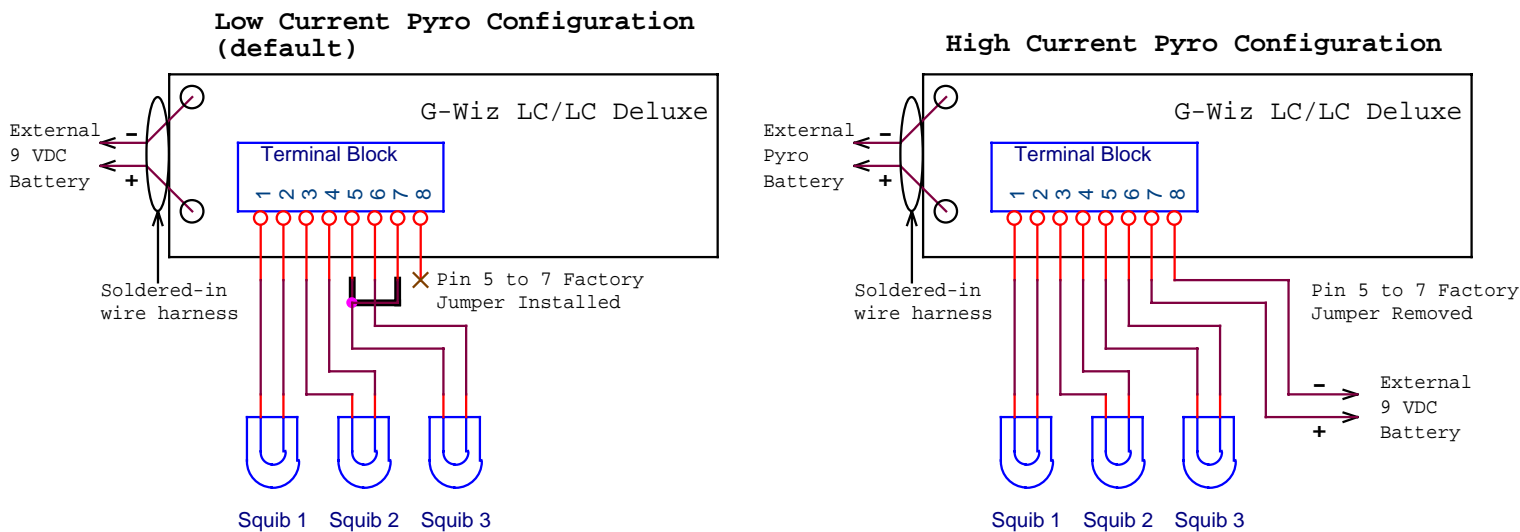
JP1- # (Terminal Block)	Function
1	Pyro Channel 1 (+)
2	Pyro Channel 1 (-)
3	Pyro Channel 2 (+)
4	Pyro Channel 2 (-)
5	Pyro Channel 3 (+) <i>LC Deluxe only</i>
6	Pyro Channel 3 (-) <i>LC Deluxe only</i>
7	Main Battery (+) <i>red wire</i>
8	Main Battery (-) <i>black wire</i>

5.0 Pyro Channels, Continuity LEDs, and Pyro Battery

Each of the 2 or 3 Pyro channels has a corresponding continuity LED. The Pyro Continuity LEDs will flash in unison with the Status LED. Each channel will fire for 1 second corresponding to the flight event detected (cluster/stage, apogee, low altitude).

When using low current electric matches, such as DaveyFire™, a single 9 VDC transistor battery will be adequate to supply current to the electric match and flight computer. If using high current igniters, like FireStar™ and IgniterMan™, you **must** use a separate battery for computer power and pyro power. To 'split' the pyro and computer power, remove the jumper between JP1 pin 5 and JP1 pin 7. The soldered-in battery wires now provide power to the pyro channels ONLY. The user must wire a second battery harness the JP1 pin 7 (+) and JP1 pin 8 (-). This can be a separate 9 VDC transistor battery or series connected AA cells producing a voltage of 12 VDC, depending on the voltage/current requirements. The following schematic will help clarify wiring. We strongly recommend using only fresh, high quality batteries, for best results. **CAUTION: IF YOU REVERSE THE POLARITY OF THE PYRO BATTERY, ANY ELECTRIC MATCHES OR PYRO CHARGES CONNECTED TO G-WIZ'S PYRO CHANNELS WILL FIRE IMMEDIATELY!!!**

NOTE: We strongly urge rocketeers to use the DUAL battery configuration when firing igniters or electric matches. These devices have peak current demands that exceed the capability of 9 VDC transistor batteries. Failure to use the dual battery configuration, when firing igniters or electric matches may ultimately result in a catastrophic flight failure. This failure is due to the momentary loss of power to the computer circuitry (just like a momentary AC power brown-out may cause a computer to crash or reset).



Users with high current Pyro channel requirements should consult Motorola's datasheet for the MTD3055VL device. This is the device used on LC and LC Deluxe. Contact G-Wiz Partners if you have higher current needs.

Pyro Channel #	Fires on Flight Event (Deluxe 400)	Fires on Flight Event (Deluxe 800)
1	Cluster or Staging (Air-start)	Cluster or Staging (Air-start)
2	Apogee (minimum velocity)	Apogee (minimum velocity)
3	Low Altitude (400' feet)	Low Altitude (800' feet)

6.0 Status LED and Altitude readout

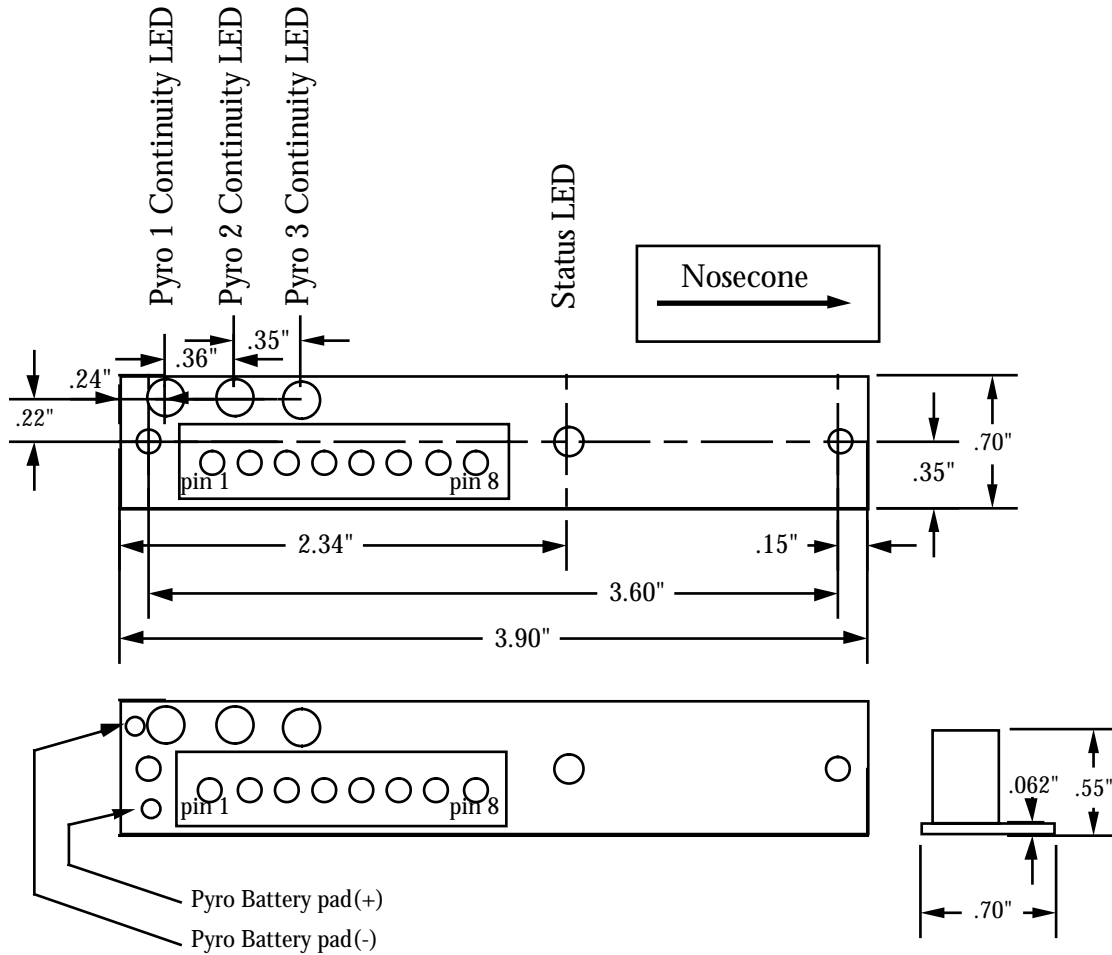
The Status LED has three functions: 1) Power-on and self-test results, 2) Operational mode of Pyro channel 1 (cluster or stage), and 3) Peak altitude flash-out (inertial altitude for LC and barometric altitude for LC Deluxe 400/800). At power-on, the Status LED flashes one long flash to indicate application of power. During this long flash, the computer tests the barometric and acceleration sensors. If the sensors are OK, the computer enters the 'idle' mode where it flashes out the operational mode of Pyro channel 1. **Note: If the LC/LC Deluxe 400/800 does NOT flash 1 or 2 flashes on the Status LED, continuously, to indicate the operational mode of Pyro channel 1, do NOT launch the computer! Contact G-Wiz Partners and arrange for service.** While 'idle' looking for launch, the Status LED flashes twice followed by a short pause. The sequence repeats continuously indicating Pyro channel 1 is in the Staging mode. A single flash followed by a short pause indicates Pyro channel 1 is in the Clustering mode. Upon launch detect, the Status LED remains extinguished during flight until apogee detection (G-Wiz LC) or until Low Altitude detection (G-Wiz LC Deluxe). G-Wiz LC will commence altitude readout, on the Status LED, after detection of the apogee event. G-Wiz LC Deluxe will commence altitude readout, on the Status LED, after detection of the Low Altitude event. Digits are flashed out, in order, from most significant to least significant digit. The number of flashes represents the digit (e.g. the number '7' is represented by 7 flashes of the Status LED). A zero is one long 'on' period. There is a 2-second delay with the Status LED extinguished before the sequence repeats.

7.0 G-Wiz Mechanical

G-Wiz is designed to be mounted using #4 hardware. There are two mounting holes provided. When mounting G-Wiz in your rocket, be certain to orient the terminal block side of G-Wiz toward the aft or motor side of the rocket. G-Wiz will **not** operate unless oriented in the correct direction (see figure below).

When installing G-Wiz LC or LC Deluxe into a rocket, it must be protected from the ejection gases produced by the Pyro charges. The gases are corrosive, will damage the Flight Computer, and void your warranty. Install the Flight Computer in a separate compartment that is gas tight from the ejection gases.

The drawing below shows the key mechanical dimension and mounting orientation. All dimensions listed are in inches.



8.0 Limited Warranty and Disclaimer

G-Wiz Partners warrants the G-Wiz LC or LC Deluxe Flight Computer to be free from defects in materials and workmanship and remain in working order for a period of 180 days. If the unit fails to operate as specified, the unit will be repaired or replaced at the discretion of G-Wiz Partners, provided the unit has not been damaged, modified, or serviced by anyone except for the manufacturer.

G-Wiz LC and LC Deluxe Flight Computers are sold as an experimental accessory only. Due to the nature of experimental electronic devices, especially when used in experimental carriers such as rockets, the possibility of failure can never be totally removed. The owners, employees, vendors and contractors of G-Wiz Partners shall not be liable for any special, incidental, or consequential damage or expense directly or indirectly arising from the customer or anyone's use, misuse, or inability to use this device either separately or in combination with other equipment or for personal injury or loss or destruction of other property, for experiment failure, or for any other cause. It is up to the user, the experimenter, to use good judgement and safe design practices and to properly pre-test the device for its intended performance in the intended vehicle. It is the user or experimenter's responsibility to assure the vehicle will perform in a safe manner and that all reasonable precautions are exercised to prevent injury or damage to anyone or anything. **WARNING:** Do not use this device unless you completely understand and agree with all the above statements and conditions. First time use of the G-Wiz LC or LC Deluxe Flight Computer signifies the user's acceptance of these terms and conditions.