



INNOVATION & TECHNOLOGY

BY GASPAR

Electric Landing Gear controller and sequencer

LGC19

Users Guide

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Manual contents & design: Gaspar Espiell. V1.0

Welcome!

Congratulations on the purchase of your new landing gear controller. *Xicoy* is 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.

Features:

- Direct control of 3 motors in bidirectional mode up to 12V/12A (it depends on the model). Supports the different motor shut-off control currently available (time, current and encoder).
- Dual control of electric brakes, full proportional, lineal and adjustable pulsed mode.
- Differential brake mode, to steer the model using the brakes.
- Steering servo processor. Gain, sense and center can be adjusted. The steering servo is centered during retraction.
- Internal Gyro. It can be mixed with the steering servo output and with the differential brakes.
- 8 servo outputs for the control of the doors, each channel has an independent re-armorable fuse, which prevents a complete shutdown of the servos if there's a malfunction on one of them. The endpoints of each servo can be programmed individually. The servo speed can be programmed independent in the two directions in 0,1s resolution.
- Dedicated servo output switching regulator, rated to 6 V. The regulator draws power from the battery instead of the receiver.
- 10 step sequencer. The position of the gears and the position of the 8 doors can be defined independent in each step. Step duration in 0,1s steps.
- Wide choice of RC inputs. Single RC channel, Dual RC channel, Futaba SBUS, UDI/MPX/JR Mode B Bus, SRXL Bus, JR Mode A Bus, JETI EX Bus, Power Box P2Bus.
- The UI and the programming of the unit is done through a separated color touchscreen. The touchscreen is not needed for the operation of the unit.
- uSD card slot to save the settings and upgrade the software.
- Advanced current cutoff control, current multiplier from start up and current multiplier time.

Installation:

Thanks to 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 to the gears be the shorter as possible to have a clean installation. As the screen is not attached to the unit it can be placed on a visible/accessible spot.

Power supply considerations: **PLEASE READ!**

This controller can receive up to 3 different power sources. In order to prevent malfunctions in your system you should know that:

The voltage of the main battery connected to the yellow AMASS connector should be of the voltage adequate for the motors and brakes on your installation. The controller can work with a battery voltage between 6.4 to 12.0V. But this doesn't mean that you can use 12V in systems designed to work at 8V. Motors will be overloaded and burn, possibly causing damage to the controller. Check the instructions of your LG supplier, and use the recommended voltage.

Please double check the polarity before connecting it. The damage caused by polarity reversal is important and not covered by warranty!!!

The battery connected to the AMASS connector powers the motors, the brakes and the switching regulator that powers the 8 servo outputs. The controller has an internal switch operated by the *Gear Input* power. It is not necessary to disconnect this battery between uses, but it is recommended to disconnect it after the flying session. There is a minimal power drawn from this battery when the unit is switched off that can drain a battery in a 2-month period.

If battery regulators are used:

The steering servo is powered by the same supply as on the steering input (*Steer In*). So, for example, if the steering input comes from a battery regulator (power Box, etc.) at 6V and the *Gear In* channel comes directly from the receiver powered at 5V, the steering servo will be powered at 6V.

The outputs for the doors are powered from the main battery via de switching regulator. It is completely isolated from the gear/brake and Steer inputs.

The power input pin of the *Gear* and *Brake* inputs are internally connected together. This could cause a malfunction by connecting different voltages together. For example, if you connect the *Gear Input* directly to the receiver that is powered at 5V and the *brake input* to a battery regulator that supplies 6V, then the 6V supply will flow through the unit to the receiver, being no longer powered at 5V by an independent regulator. In this case, it is necessary to cut the central wire (red) on the lead from *Gear In* to the receiver to prevent the voltage present at *Brake In* to reach the receiver.

All negative (ground) connections are connected together inside the unit. Always fully disconnect the batteries (both poles) from the installation before charging, as current can flow through the unit from one battery to the other during charge, damaging the installation.

Please contact to Xicoy Electronica for advice on particular installations.

Electrical connections:

On the right side of the case there are the connections for the main battery, brakes and retracts. Connect each item to its socket and follow the polarity showed on the sticker.

Brake polarity is not important. Motors polarity should be the correct in order that the gear is extended when the screen display "Gear Down". Reverse the connection in the case that the retracts move inversely as desired. Please take into account that the 12A model has specific AMASS connectors for each gear (connectors provided) and the connector can't be reversed.



On the left side there are the RC connections.

Gear In: This is the main input for the RC power and commands.

It gives power to run the internal processor and display. The internal processor accepts up to 9V.

The RC commands on this input would depend on the mode used:

-Normal servo mode, dual channel: This input will control the deployment of the gear. Brakes will be controlled by the command received on "Brake In" input.

-Normal servo mode, single channel: Gear deployment and brakes will be controlled by this input; signal present on "Brake In" input will not be used.

-BUS Mode: Connect here the SBUS/XBUS/UDI/SRXL/EXBUS/P2BUS/MPX/JR Mode A/B from the RX. The commands for Gear, Brake and steering will be extracted from the appropriate channels on the decoded bus protocol. All the channels are user selected, head to **Radio** for further information.

Brake In: Input for the brake command when dual channel mode is used.

Out 1 ... 8: Outputs for the 8 servos to operate the doors. The power for these servos will come from the main battery through its dedicated switching regulator.

Steer In: Command input for the steering servo when *Normal Servo mode* is used. Signal could come from a dedicated receiver output or through a "Y" lead from rudder channel. Center and sense of movement can be adjusted, to allow adjusting the travel and center of the steering servo without influencing the rudder.

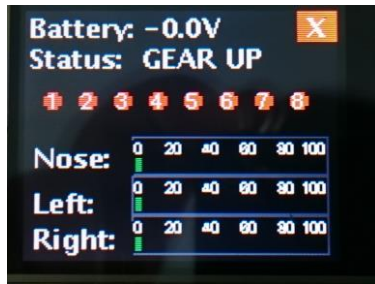
Steer Out: Output for the steering servo. Signal is processed, according to the center, gain and gyro mixes when the gear is deployed, and centered during retraction.

Note: The power for the steering servo comes from the *Steer In* input, to allow using different voltages. In the case of using BUS input, a patch lead should be connected between the Steer In to the *Brake In* connectors to supply power to steering servo.

Main screen:

All programming is done through the color touchscreen. The different programming options are separated in dedicated screens, making the adjustment very easy to understand.

Operation is divided in two main areas. At power up the operation status is displayed:



First line: Battery voltage

Second line: Status

Third line: Door state. Green means open, red closed.

Bar graphs: in all states except in **Gear Down**, the power used by the motors is displayed.

In **Gear Down** state, this indication is replaced by the power applied to the brakes.

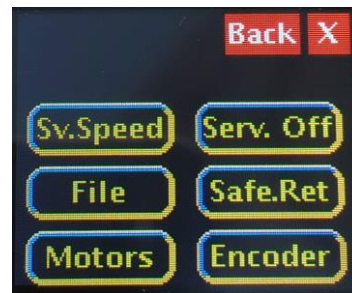


Setup:

Once you leave the main screen, the logo screen will appear. Here you can choose to go back to the main screen, head to setup or open the manual operation menu.



Touching the *Setup* button, all the available options will be offered, spread in two screens. The software version will appear on the top left corner of the screen and under it the model of the unit.



Touching the buttons, the relevant adjustment page will be displayed.

It is recommended to not connect the main battery nor the servos during the first stages of the setup to avoid uncommand movements.

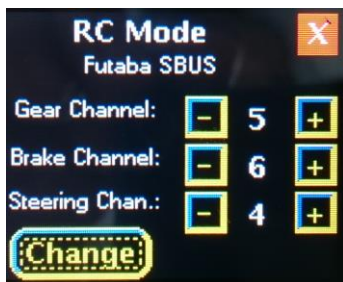
Radio:

There are different options for the radio commands. First you should decide if you will use separated channels or BUS. Bus is convenient when the receiver outputs are reduced but the TX has more channels, for example, a TX of 16 channels being used with an 8ch receiver. You can set the LG19 in BUS mode, and assign three of the channels not available in the RX (say 9, 10 and 11) to control the Gear, Brakes and steering servo, leaving all 8 channels on the RX available for all other functions.



Touch the RCMODE button to select the type of RC you wish to use. The screen will change trough all available modes. *Standard servo, Futaba SBUS, UDI, SRXL, XBUS_A, JetiEX, P2Bus, MPX, XBUS_B.*

In all modes except *standard servo*, the selection of the desired channel for each function is done through the +/- buttons. In the picture, the Gear will be the CH5, the brake the CH6 and steering the CH4.



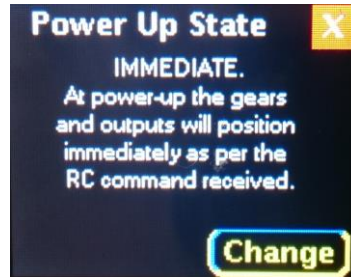
Once the RC Mode is selected and the channels assigned, now you should adjust the endpoints for the Gear channel and for the Brake Channel. Touch the *RC SET* button. This will drive you through the alignment sequence.



Screens are self-explaining, just follow the instructions. If during the radio alignment there isn't a valid RC signal on *Brake IN* input, the system will assume that it should work in single channel mode, and will expect that the defined position for the gear down command be at an intermediate point between *Gear Up* and *Maximum brake*. For example, *Gear Up* 1.000us, *Gear Down* 1200us, *Full brake* 2000us.

Power-Up.

Touching the *Change* button, allows you to scroll through the 3 different power-up options.



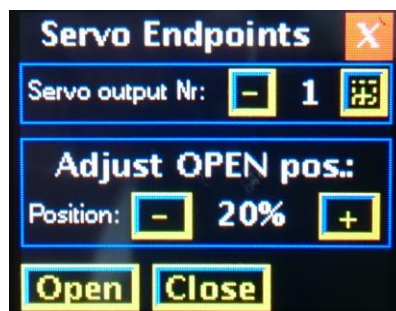
Immediate: The servos and gears will be activated immediately as per the RC command received.

Check Switch: The Gears and servos will be powered only if the command received is Gear Down, preventing the gear to collapse if the system is powered with the switch in the retracted position.

Cycle Switch: The gears and servos will not be powered until a full cycle on the gear switch is done.

Servos:

The open and close positions of each of the 8-servo output can be individually adjusted through this screen.



Select the servo output to be adjusted (1 ... 8) using the buttons on upper line.

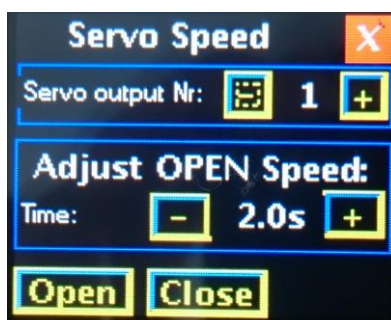
Touch the *Open* button to adjust the position of the door when in OPEN position. Using the position buttons, adjust the door to the desired position.

Touch the *Close* button to adjust the position of the door in CLOSED position.

If the readings are below 60%, you may consider changing the mechanical links to have more servo travel and higher torque at the door. Specially check that the servo is not fighting against a hard stop, this would cause the servo to burn quickly. If possible, use an amperemeter to check the power used by the servos to assure that they are not mechanically overloaded.

Servo Speed:

The adjustment procedure is similar to the previous section. This screen will allow to adjust the speed desired to open or close a particular door, the speed in each direction is defined separately.



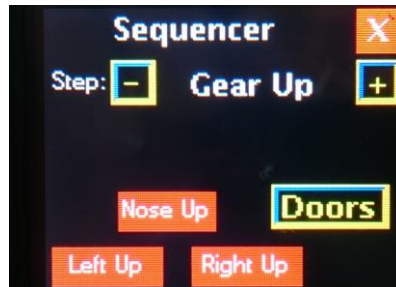
Servo Drive:

This menu is self-explanatory. Press the "Change" button in order to navigate through the servo drive options available.

Sequencer:

The sequencer has 10 independent steps. In each step, the position of all 11 outputs (3 gears and 8 doors) can be defined.

Using the +/- buttons on the top line you could select the step to be modified.

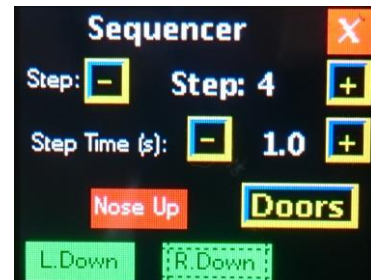


Once the step is selected, the positions of the 3 gears and the 8 doors can be defined.

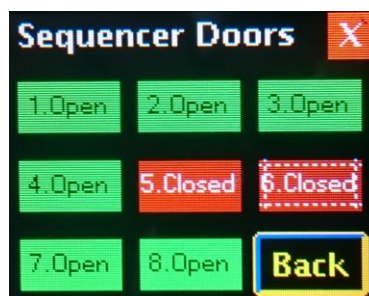
Touching the color buttons in the bottom of the screen, will toggle the position of this particular gear in the step being adjusted. Red color means that the gear is in UP position, Green color in down position.

On intermediate steps the duration of each step is defined in 0.1 s increments.

To define the position of the doors in each step, touch the *Doors* button.



Same as with the gear setup, touching the button of each output will toggle between the closed and opened state on the current step selected.



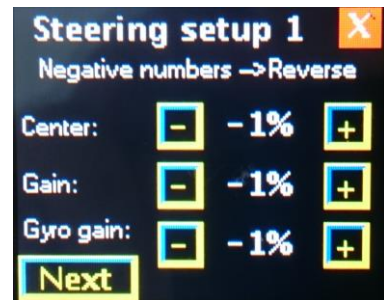
Notes:

-The step duration is not linked to the speed of the servo defined in the *servo speed* screen. This can cause that a step could be executed after the command on previous step is finished. For example, if the speed of a door is defined to open in 4s, but the step time is of 1s, the next step will be executed while the door is still opening.

-The last two steps on each sense (Step 2 and Step 7) will not be executed until the gear movement is finished. For example, if the delay of all steps is less than the total time for the gear to extend, the system will wait in Step 7 until the gear is fully deployed; independently if the time set is lower, to prevent a door to close while the gear is still moving.

Steering processor:

These screens allows the adjustment of the steering servo. It is possible to center, change the direction of the movement, reverse, and mix it with the internal gyroscope. These features allow using same RC Channel as the rudder, while retaining the capability of precisely adjusting the steering.



Also, during retraction and while the gear is retracted, the servo is kept centered without movement.

On first screen, the adjustment of servo center, gain and gyro gain are displayed. To reverse the action of the servo or the gyro, simply use negative numbers.

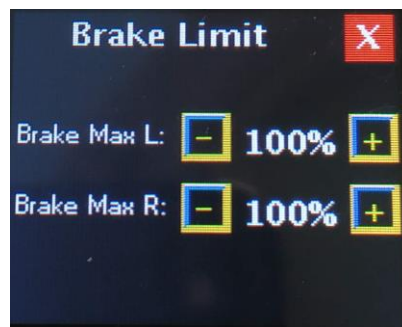
Next screen allows to adjust the center of the servo during retraction.

Brakes:

There are 5 adjustments possible for the brakes.



If the Limit button is pressed the brake Limit screen will appear. This screen allows the reduction of the brake power for each brake (separately). It may be useful on light planes.



Pulse ratio: Applies a force modulation on the brakes in order to keep the wheel rotating to avoid creating flats on the tires in 5 different levels. A ratio of 1/3 means that the low force pulse is 1/3 of maximum force.

Steering Mix: It is possible to mix the steering channel to the brakes, in order to steer the plane using brakes (usually on warbirds like the P-47). This percentage adjust the influence of the steering channel to the brakes. Same as in the steering processor, use negative numbers if you need a reversed action.

Gyro Mix: Same as the steering mix, this adjustment allows to mix the gyro with the differential brake.

ALWAYS while modifying these settings, begin with modest values and increase as needed after testing with the plane, too high gain could have the brakes acting all the time at the minimum vibration.

Motors:

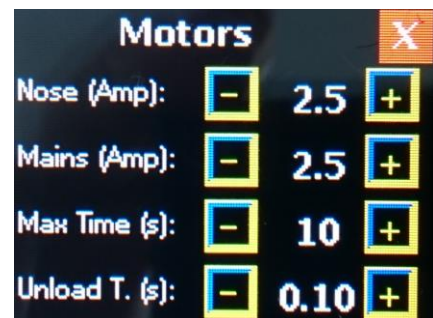
This adjustment is available only in generic controllers. Those supplied in a kit by a landing gear manufacturer could have these screens locked to avoid damaging the motors or gearboxes if the settings are not correct.

The adjustments are:

Nose Amp: Maximum amperage for the nose gear.

Mains Amp: Maximum amperage for the main gears.

Max Time: Maximum allowed travel time.

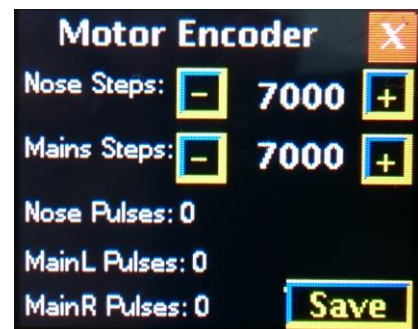


Unload Time: Time of the motor run in reverse to unload the gearbox after hitting the end of travel.

CAUTION: USE THE SETTINGS RECCOMENDED BY YOUR GEAR MANUFACTURER. You can burn the motors or damage the gearbox if the amperage or the battery voltage are higher than the maximum allowed.

Encoder:

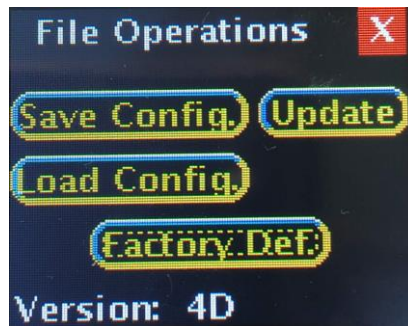
If the gears used include a pulse encoder, on this screen is possible to adjust the pulses for each cycle. First line adjusts the steps on nose gear, and second on mains, this allows the use of different gears on mains than on nose. Even if using the encoder option, the overcurrent threshold and the maximum time protection will apply. All 3 settings should be adjusted to ensure a correct operation.



Bottom lines are displaying the current count, in order to help with the correct adjustment of the value.

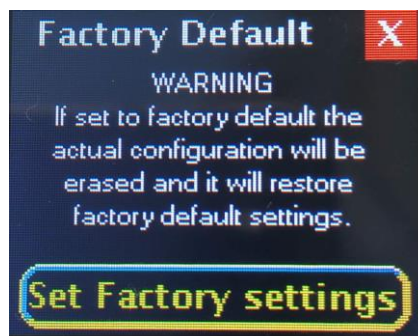
File:

The controller has a socket for a uSd card that is not necessary for normal operation, nor supplied as standard.



The card allows to save all the settings to a file, load these settings, update the firmware of the controller and set the default factory configuration. Bottom line displays the current software version.

If the Factory Default button is pressed the following screen will appear:



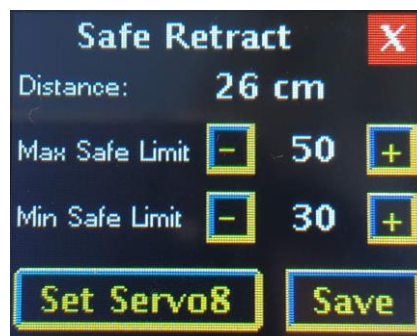
Once the "Set Factory settings" button is pressed it will immediately erase all the configuration stored, this means that all the sequencer, doors and everything will be set to the factory test settings. Just use this option if you touched something on the

configuration and you don't know how to put it back to standard operation. Please, take into consideration that if the unit is supplied by a landing gear manufacturer this option won't load the configuration used by them. So, consult your manufacturer before doing it.

Safe Retract:

At the time of writing, this screen is intended to be used with a product that will be available soon. It is a really small gadget with a laser reading sensor.

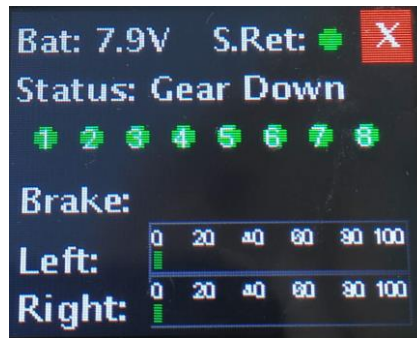
If you want to operate with the safe retract connect it to the channel 8 and press "Set Safe.Reetr". This will cancel the output 8 as a servo channel and will use the Safe Retract instead. Otherwise, if the normal servo operation is needed just press "Set Servo8" and the 8th channel will be used again as a servo output.



The gadget has two functions; it reads the distance to the ground and prevents unwanted retract commands if the model is inside the safe zone. The safe zone can be configured within the Max and min safe limits (cm). If you want to change the limits, use the "+" and "-" buttons and press the "Save" button once it's done.

The Safe Retract will allow any kind of command if the unit is out of range or if it's not in the safe zone, otherwise it will only allow deploy commands. If the model stays 5 seconds inside the safe zone after being out of it, the protection will apply again. If the unit does not detect any Safe Retract it will ignore it but the servo channel 8 will be disabled.

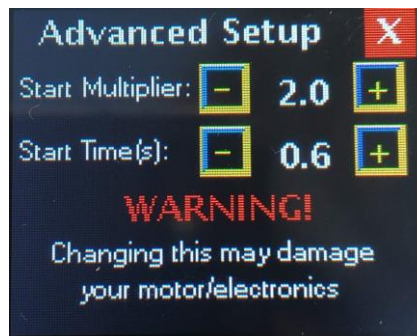
Furthermore, if the safe retract is being used and detected the following will appear on the main screen:



The green circle means that the model is inside the safe zone, otherwise it will turn red and will mean that the model is outside the safe zone. If the communication with the safe retract is lost/disconnected the feature will disappear and it won't affect any landing gear command.

Advanced motor Setup:

This screen will allow to multiply the startup current (the one that is chosen on the motors menu) for the first tenths of a second. This will allow bigger landing gears which have heavy loads and heavy current peaks to move with a lower cutoff current. The default values are shown on the image.

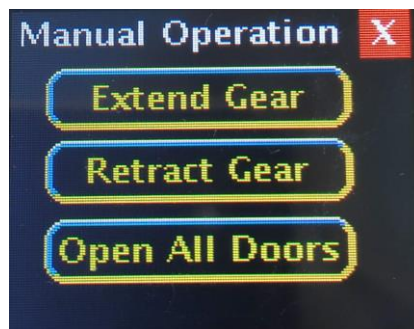


By the time that this guide is being written this menu is hidden. The reason is simple, if these parameters are changed recklessly it may cause heavy damage to the motors and

to the electronic itself. So, if your installation needs the action of this particular feature, please contact us and we will give you access. Of course, if these values are changed, we won't be responsible of the damage that it may cause.

Manual Operation:

This screen is accessed by pressing the "Man." Button on the logo screen. The purpose of this screen is to allow the user to extend, retract and open all doors without the need of a servo/bus signal. Furthermore, it will surpass the radio commands if any of the buttons here are pressed. Please take into consideration that it will only let the user open the doors if it's on "Gear Down position". This feature will also run the current cutoff, time and encoder configurations. It is pretty useful if you want to test the installation just with the gears plugged in.



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.