

LUXPAK: User guide

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1. LUXPAK presentation

LUXPAK represents the Luxembourg contribution to the [H.A.L.E. contest](#). It's a payload for the high altitude balloon project that intends to transport several LEGO® Mindstorms® based objects to the stratosphere. LUXPAK essentially is a black polystyrene container that is filled with sensors and control devices trying to measure the vertical profile of a few interesting meteorological values:

- Ozone concentration
- Air pressure
- Air temperature
- Earth back scattered light

The equipment for the measurement of these data is described in the document **luxpak equip.doc**. The control devices based on the LEGO® RCX are explained in the document **luxpak control.doc**. The pedagogical aspects of the LUXPAK project may be read in **luxpak pedagog.doc** and the development journal can be followed at <http://www.convict.lu/htm/rob/hale.htm>.

On its way to the stratosphere and back to ground by parachute, LUXPAK will be exposed to extreme cold, high radiation, almost vacuum and hard impact. Precautions have been taken to encounter these extraordinary physical conditions.

The measurement container is part of the H.A.L.E. payload series. It therefore was essential to keep the weight minimal. Although the initial estimates were a bit too optimistic around 1200g, the final version weights 1600g.

LUXPAK has been realized in Luxembourg from April to July 2008 by Claude Baumann, Francis Massen, Jean Mootz, all three Luxembourg high-school pedagogues, further the [Bischöflisches Konvikt Luxemburg](#) robotics group and a 12th grade math class in collaboration with the [Lycée Classique Diekirch meteorological station](#). The project has been supported by Jean-Claude Krack (LCD).



Fig. 1: LUXPAK's general aspect. ABSOLUTELY RESPECT THE CONTAINER ORIENTATION! If removed, the cover must be reset correctly. OBSERVE THAT THE WHITE MARKS DO CORRESPOND!

Polystyrene container	300g
RCX	115g
SNOOP LOG	50g
O ₃ -sensor (with box)	174g
Pressure sensor (with box)	51g
Mootz-board with light sensor and PT100	85g
Opto-coupler	20g
"Gasperi" sensor multiplexer (with box)	50g
Voltage stabilization	20g
Tube heating resistors	64g
Glass-wool	116g
Teflon and silicon tubes	30g
Wires, switch, LEDs, NTCs, touch sensor, thermo fuses	140g
Battery pack	141g
LEGO pieces and other plastic material	150g
Glue, tape, Velcro fasteners, isolation material ...	75g
Silica-gel	19g
Total	1600g

Table 1 : LUXPAK's weight data

1.1. The container

The LUXPAK container is a black hard polystyrene box of 29mm wall diameter and the dimensions 300x250x153 mm³. The black colour was chosen in order to profit of the heat absorption of sun radiation. The material has excellent isolation characteristics and certainly helps keeping the interior temperature high enough. The container can easily be opened by detaching the Velcro fasteners.

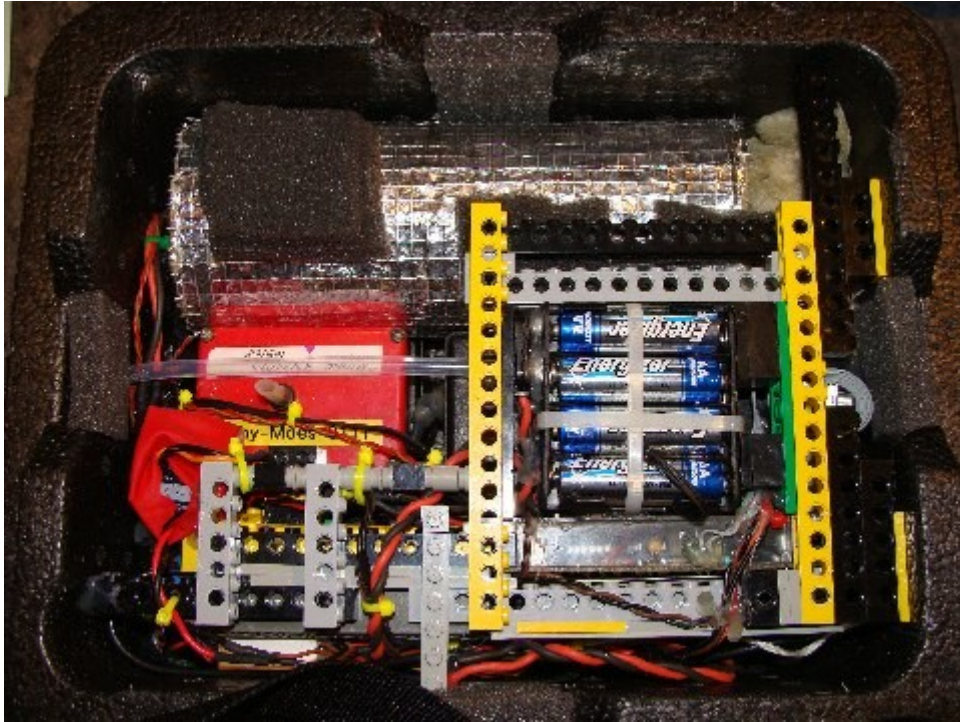


Fig. 2: A glance at LUXPAK's interior

1.2. The balloon string tube

The LUXPAK container is traversed by a small Teflon-tube that has been fixed on the top and the bottom by glued yellow LEGO® plates. After having pulled the main balloon string through the tube and having fixed it, the ground team should in any case close the tube holes by silicon in order to prevent it from becoming a cold radiator inside the container.



Fig. 3: The main balloon string should pass through this tube.

1.3. The air inlet and outlet for the ozone sensor system

In order to prevent the ozone sensor from being exposed to extreme cold temperatures that would make valid measurements impossible, a heated tube system has been installed that transports the air to the sensor nose. The air movement is guaranteed only, if both the inlet and the outlet are free from any obstruction. A small Mosquito net has been fixed to the inlet as can be seen on Fig. 4.

It is essential that LUXPAK is correctly fixed to the balloon. The inlet must point upwards. The outlet is made of a tiny stud on the bottom next to the back scattered light sensor. (**OBSERVE THE UP.↑ SIGN AND THE ARROW ON THE CONTAINER SIDE cf. Fig. 1**)



Fig. 4: The air inlet for the ozone sensor with protective Mosquito net on the top of LUXPAK

1.4. The light sensor and the air temperature sensor

The ESR light sensor and the PT100 temperature sensor ought to point downwards. As LUXPAK measures the Earth back scattered light and the air temperature, it is important that these sensors are not directly irradiated by the sun.



Fig. 5: The air outlet stud from the ozone sensor system can be seen on LUXPAK's bottom (right picture corner). The ESR light sensor is visible and in the upper region of the picture also the PT100 temperature sensor.

1.5. The main switch

LUXPAK has been designed to be switched on by one single button. In order to protect the switch from accidentally being activated during the transport from Luxembourg to Nevada, a hard paper has been pulled over it. The transparent silicon protection has been added to prevent any humidity or frost from slipping into of the electric circuitry. If the switch is activated with installed batteries, LUXPAK immediately starts by waking up the LEGO® RCX. A special electronic device inside of the LUXPAK container will then download the firmware to the RCX and automatically run the programs that control LUXPAK's functions.

1.5. The LEDs

LUXPAK has three LEDs that indicate how the on-board devices are running:

- **Red LED** : this LED in fact belongs to the SNOOP_LOG circuitry (cf. [luxpak_control.doc](#))
 - At system start, this LED blinks at a rhythm of 1 beat per 2sec indicating that SNOOP_LOG is bootloading the RCX
 - Once the RCX has been automatically booted, the yellow LED goes on and the red LED shuts off (after 5 minutes)
 - Once the "REMOVE BEFORE FLIGHT" panel has been removed, the datalogger starts running. Now the red LED

flashes shortly almost every 10th second to show that a data record is being stored.

- During datalogging the red LED also serves to indicate current errors through a fast flashing of a few seconds followed by a slow blinking. The number of blinks represents the error number.
- **Yellow LED** : this LED indicates that the RCX is correctly running the firmware. At start, with the “REMOVE BEFORE FLIGHT” panel in place, the system enters a kind of stand-by mode, where the 800mW heater is on and the ozone-sensor internal batteries are being charged.
- **Green LED** : this LED notifies that the datalogging process is running and that LUXPAK is ready for launch.
 - If LUXPAK is started with a warning message, the green LED blinks a certain number of times, where the number represents the warning ID number. After this the green LED is on, although the datalogger isn't running. (refer to Annexe C “Troubleshooting”)
 - After the flight mission the datalogger is stopped and the green LED is switched off, if the data upload procedure is manually started.
 - If the datalogging process is resumed, the green LED is switched on again. (for resuming the datalog process consult Annexe C “**Troubleshooting**”)
 - At low battery state, the RCX is programmed to switch off the LED in order to save energy.
 - The green LED is not turned off, if the datalogger memory is full.



Fig. 6 : LUXPAK's main switch starts the whole engine except the datalogger and the ozone tube heater. If LUXPAK is ready, the yellow LED goes on. Once the datalogger is running, the green LED also shines. Beneath the transparent LED block is visible and finally the RCX button that has to be released before launch in order to activate all vital flight functions.

1.6. The “REMOVE BEFORE LAUNCH” panel

LUXPAK must be switched half an hour before flight. This time is necessary to bootload the RCX, to charge the ozone sensor’s internal batteries and to pre-heat the sensor’s nose. The 800mW heater will charge the container’s inner material with thermal energy. Just before the flight, the special panel labelled “REMOVE BEFORE LAUNCH” needs to be taken off. This final operation starts the datalogging process and runs the heater control procedure. During flight the datalogger will monitor the following data values at a rate of 1 record within 10 seconds. It is very important that before switching on LUXPAK, the operators make sure that the “REMOVE BEFORE LAUNCH” panel perfectly presses down the touch-sensor behind it.



Fig. 6 : This panel must obligatorily be removed before the balloon is launched. Otherwise the whole mission will be worthless.

Data index	Owner	Measured data	
0	SNOOP_LOG ADC AN0	Air pressure	
1	AN1	Ozone concentration	
2	AN2	Air temperature	
3	AN3	Reference voltage (always 0x3FF raw)	
4	AN4	Back scattered light intensity	
5	RCX	System time	
6	RCX Sensor1	Heater temperature	
7	RCX “Gasperi” multiplexer (Sensor2)	G_Port1	Ozone sensor temperature
		G_Port2	Battery temperature
		G_Port3	RCX temperature
8	RCX Sensor3	Voltage across green LED and RCX touch sensor (monitors minimal voltage changes)	
9	RCX OutputA	Output state (LO); power (HI)	
10	RCX Battery voltage	Voltage that supplies the RCX circuitry (behind internal rectifier bridge)	
11	0x0D0A	End of line string (LF/CR)	

Table 2 : The order of the LUXPAK logged data.

2. Install the batteries and close LUXPAK

LUXPAK is delivered without batteries installed. This is an important measure to secure the whole device for the transportation from Luxembourg to Nevada.

- I. Open the LUXPAK container by detaching the yellow Velcro fasteners (Fig. 7)
- II. Install eight ENERGIZER L91 Lithium AA-batteries into the battery pack (Fig. 8) – Observe the polarity ! (refer to **Annexe B** for battery data) – Put attention not to harm any of both thermo-fuses on the bottom of the pack nor the thermistor on the side (Fig. 9).
- III. Vibrations might loosen the batteries from the springs. Therefore the whole pack should be secured with a cable binder that the operator must **tie very strongly** (Fig. 10). The nylon connector ought to point downwards and should best be situated in the middle of the pack.
CAUTION WITH THE FUSE- AND SENSOR WIRES!!!
- IV. It is recommended to add a second cable binder. This one should be fixed with less force in order not to damage the battery holder. (Fig. 11)
- V. Insert the battery pack.
- VI. The ground operators should now measure the voltage on the contacts. With fresh batteries the voltage should at least be 13V.
- VII. To test, if everything is fine, shortly switch on the main button, wait for the RCX characteristic “beep-beep” sound and observe the red LED flashing. If the LED flashes normally, switch off LUXPAK again.
- VIII. LUXPAK is now definitely closed. The orientation of the container is essential for the good working of the payload. Respect the white marks and the white **UP. ↑** sign. (Fig. 12 & 13)
- IX. In order to prevent the wind from loosening the Velcro fasteners, their ends absolutely should be fixed with adhesive tape. Also the slit between the main container body and the cover needs to be protected with adhesive tape. **PUT ATTENTION TO KEEP FREE THE AIR INLET, OUTLET, LIGHT SENSOR, AIR TEMPERATURE SENSOR, SWITCH...** (Fig. 14)
- X. Now LUXPAK is ready for use. (Note that the batteries guarantee a very long shelf duration. No current is drawn as long as the main device switch is off and no LED is on. Thus, the battery install could be done at LUXPAK reception from Luxembourg.)



Fig. 7 : The container is closed with Velcro fasteners.

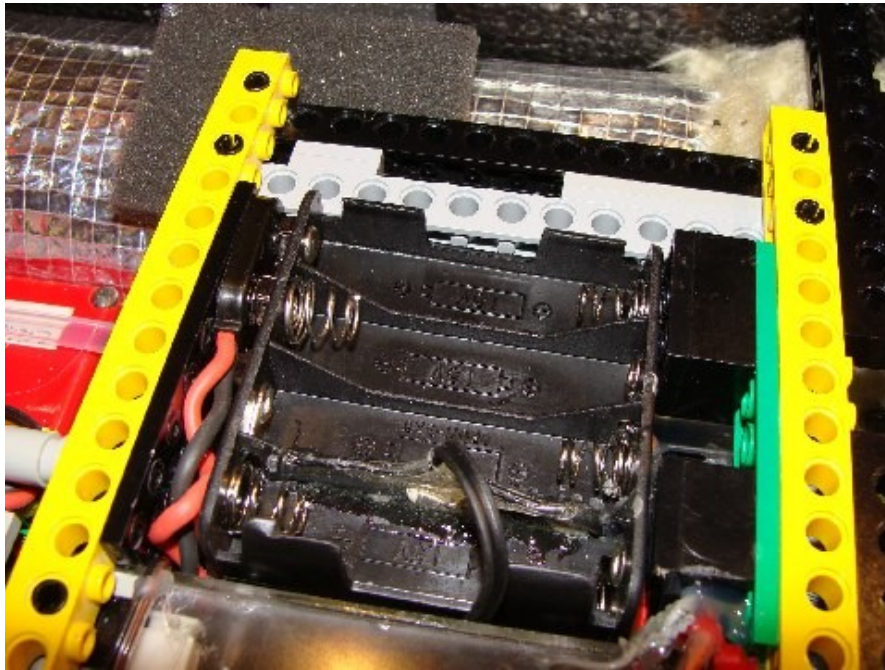


Fig. 8 : The empty battery pack with one of the two thermo fuses that are glued on each side to the bottom of the pack.



Fig. 9 : The thermistor has been glued to the side of the battery holder.



Fig. 10 : Secure the batteries from slipping out of the holder with the help of a cable binder.



Fig. 11 : The second binder should cross the first one and should not be forced too much. On this picture the battery holder is already squeezed, which could damage the holder. The ground operators **must be very cautious here.**

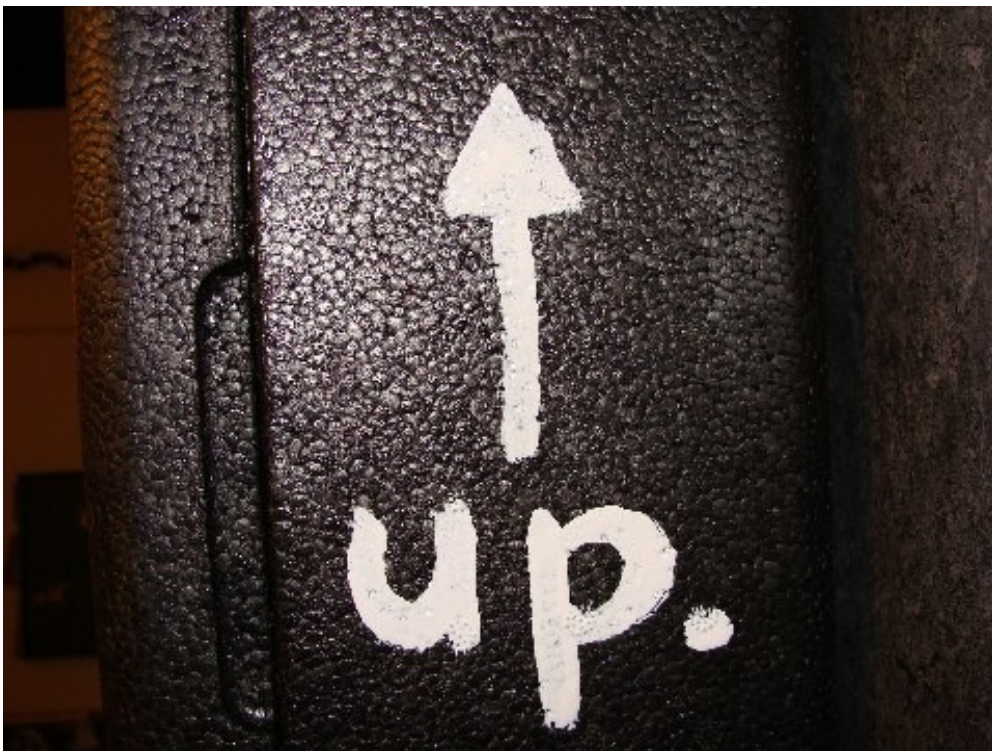


Fig. 12, 13 : The container orientation is essential for good function of the payload.

3. Half an hour before launch

BEFORE PASSING TO THE NEXT STEP, BE SURE THAT THE “REMOVE BEFORE LAUNCH” PANEL IS STRONGLY FIXED TO LUXPAK’S CONTAINER WALL !! NOTE THAT THIS MAY BE EASILY CONTROLLED BY LOOKING AT THE GREEN LED THAT SHOULD BE COMPLETELY SWITCHED OFF (NOT EVEN LIGHT WEAKLY).

LUXPAK is an autonomous machine that –besides the battery install- needs only two human manipulations to run. Half an hour before flight the main button (cf. 1.5) is switched on by pressing down the “I” side of the switch. The button will permanently stay in this position and should not be touched anymore.

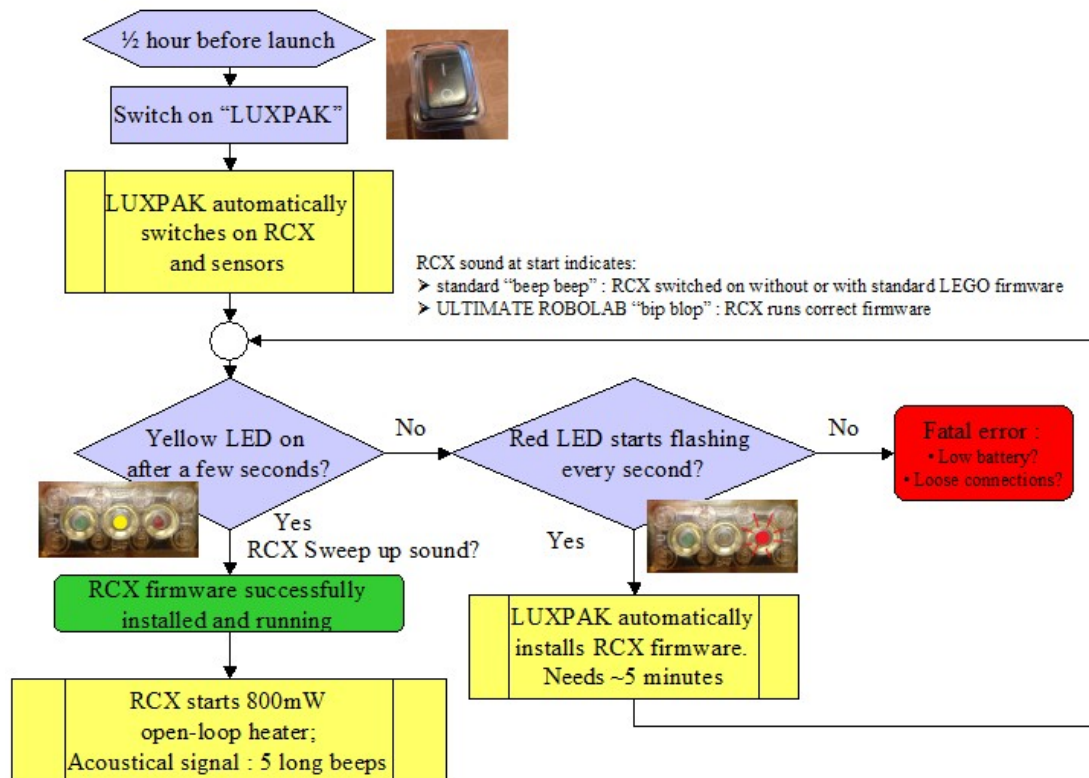
LUXPAK now automatically awakes first the SNOOP_LOG module, then the RCX module (cf. document [luxpak_control.doc](#)). SNOOP_LOG first acts as a bootloader for the RCX and transmits the specially developed firmware to the LEGO® brick. The red LED should flash every second during this phase that normally lasts for 5 minutes. Once loaded, this firmware takes over LUXPAK’s control. The successful firmware install is notified by a typical RCX “sweep up” sound (well audible through the container walls). The yellow LED now should be constantly on and the red LED should be off. Then the RCX sends 5 acoustical “beep” signals followed by a “sweep down” sound.

Now LUXPAK starts the 800mW heater and the charger of the ozone-sensor internal batteries. This procedure should not exceed 1 hour, because the batteries would be exhausted before the end of the mission.

CAUTION: The ground operators should estimate well the time needed to prepare the balloon for launch. Switching on LUXPAK costs expensive electrical power !!! If for any reasons the launch is seriously delayed (more than 30 minutes), the operators **MUST** obligatorily switch off LUXPAK and replace the batteries with fresh ones, otherwise the full function over the projected mission time is not guaranteed. After battery replacement, LUXPAK has to be switched on again. Before passing to the next step the operators must wait for the yellow LED shining and the described acoustical signals.



Fig. 14 : The Velcro fasteners need to be secured and the slit between the main body of the container and the cover needs to be closed with adhesive tape.



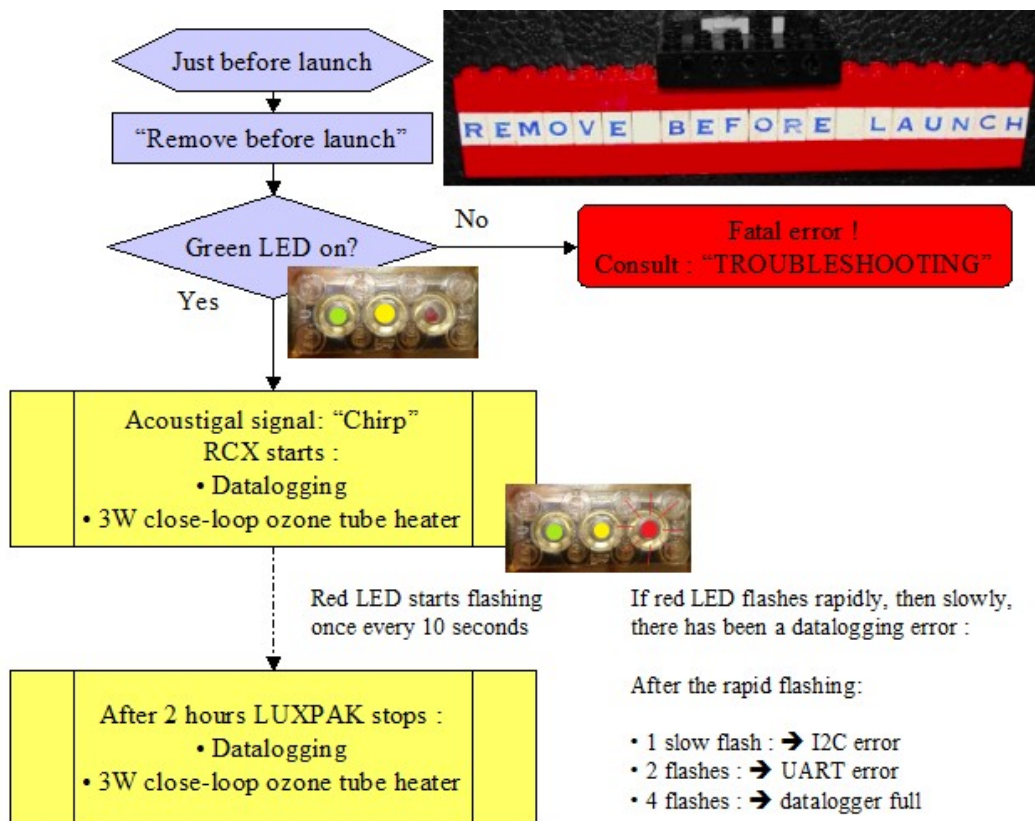
Flowchart 1 : The blue marked blocks are executed or observed by the ground team.

NOTA BENE : If the green LED is on at this point, LUXPAK passes into a warning state that is acoustically notified through 3 successive "buzz" sounds and the fact that the green LED starts blinking twice. In that case the **"REMOVE BEFORE LAUNCH"** panel was not correctly fixed and didn't completely press the LEGO® touch-sensor behind it. A blip..blip sound (ROBO LAB "chirp" sound) is heard and the datalogger and both 3W-heaters are immediately started, which is a failed action that will probably power out the batteries even before regular launch. If this happens the only solution is to immediately switch off LUXPAK, correctly replace the **"REMOVE BEFORE LAUNCH"** panel and retry the procedure. There will always be a trace of such an event, because the datalogger already stored a few values. Note that at reboot, the system time is reset. This will be visible on the data later on upload.

➔ It is essential to verify that the **"REMOVE BEFORE LAUNCH"** panel strongly presses down the touch-sensor before switching on LUXPAK. Note that the touch-sensor is very sensitive, because the RCX port to which it is connected is shared with the green LED.

For all error states, please consult the **Annexe C** "Troubleshooting".

4. The moment of launch



Flowchart 2 : The moment of launch ! By removing the inhibiting panel, the datalogger and the heater control system are started.

At the moment of launch, the panel **“REMOVE BEFORE LAUNCH”** should be detached. The green LED goes on, the RCX notifies with a “blip..blip” (ROBOLAB “chirp” sound) that it started the next procedure, which is running the datalogger process and heating the ozone-tube.

At each data sampling, the red LED shortly blinks once. If the red LED flashes rapidly then starts blinking, an error occurred. The number of red LED blink cycles returns the error number:

- 1 slow blinking after the rapid flashing : I2C error (never happened during any of the tests, so don't expect this error.)
- 2 slow blinking after the rapid flashes: UART error (in the tests only happened once after data upload, then disappeared. So, this should not happen either.)
- 4 slow blinks after the rapid flashing: datalogger full (this could only happen, if the LUXPAK datalogger has run for more than 2 hours; if this error happens by accident, follow the datalogger reset procedure in the **Annexe C** “Troubleshooting”)

If all went well so far, LUXPAK is ready for launch. Note that the datalogger and the heating processes may not run for more than 2 hours. So, once these

processes are activated, the balloon launch should immediately take place after the activation.


LUXPAK is programmed to run until battery exhaustion (estimated to a maximum of 3 hours). Precautions have been taken that non-vital functions are disabled as the batteries weaken. However, the RCX cannot be switched off, because SNOOP_LOG immediately would think that the brick is no longer present and would awake it and try either to run or to install the firmware on it. The RCX will be running even at very weak batteries. Only if the processor detects brown-out conditions, then the RCX will switch off. In that case SNOOP_LOG will not be able to awake it anymore. Note that SNOOP_LOG is based on a PIC 16F88 microcontroller that runs at very low voltage. To prevent bad behaviour the brown-out detection has been activated on this microcontroller too.

5. How to extract the data

After the flight missing, depending on how long it took to find back the H.A.L.E. payloads, assuming LUXPAK survived the hard impact after the parachute coming down, either the system is still running or the batteries are completely exhausted. The state should be visible through the LEDs. If the yellow and the green LED are still on and the red LED keeps on flashing, there is enough power to upload the data. Otherwise, the batteries have to be replaced.

A. Procedure to extract the data in the case of good battery state.

The good battery state is proven by the permanent lighting of the **green** and **yellow** LEDs and the regular blinking of the **red** LED.

- I. Open the LUXPAK container as shown on Fig. 7 (section 2 “Install the batteries”).
- II. Reinstall the **“REMOVE BEFORE LAUNCH”** panel. In order to prevent the datalogger from restarting the inhibiting touch-sensor is pressed by the panel. (Note that LUXPAK never overwrites data, even if a complete system reboot happened, unless a datalogger reset procedure has been executed. Consult Annexe C for more information.)
- III. Unroll the RS232 cable (Fig. 15) and connect it to a Laptop COM-port (works as well with an RS232/USB converter)
- IV. In LabVIEW8.1 run **“S_L_VIEWER.vi”** that may be found on LUXPAK’s web-site <http://www.convict.lu/htm/rob/hale.htm>.
- V. Now press the “LOAD” button on the screen as shown on Fig. 16.
- VI. Press the grey PRGM-button  on the RCX. The RCX sends a message to SNOOP_LOG to upload all the valid data in memory. Now the data should stream to the PC as it is visible on Fig. 17.
- VII. Wait until the “Data” indicator on the screen changes to green. At this instant all the available data has been uploaded (Fig. 18).

- VIII. The raw data may be saved to file by using normal file menus or by switching to the next tab-page (Fig. 19).
- IX. Every data set can be viewed by selecting the “Data” tab-page (Fig. 20). It can be exported to a spreadsheet program or the graph can be saved as a picture bitmap.
- X. In this procedure, the upload can only be operated once.

B. Procedure to extract the data in the case of low battery state.

If the LEDs are not lighting as indicated above, LUXPAK has low battery state. In this case follow the sequence:

- i. Open the LUXPAK container as shown on Fig. 7 (section 2 “Install the batteries”).
- ii. Reinstall the **“REMOVE BEFORE LAUNCH”** panel. In order to prevent the datalogger from restarting, the inhibiting touch-sensor is pressed by the panel.
- iii. Replace the batteries (section 2 “Install the batteries”).
- iv. Switch on LUXPAK and wait 5 minutes, the time necessary to reboot the system.
- v. Now continue the procedure explained in the previous paragraph starting at point III.
- vi. By contrast to normal procedure A , in this procedure , the upload can be repeated as often as desired.



Fig. 15 : This RS232 cable should be unrolled and connected to a PC. (The battery block needs to be removed from its location in order to reach the cable.)

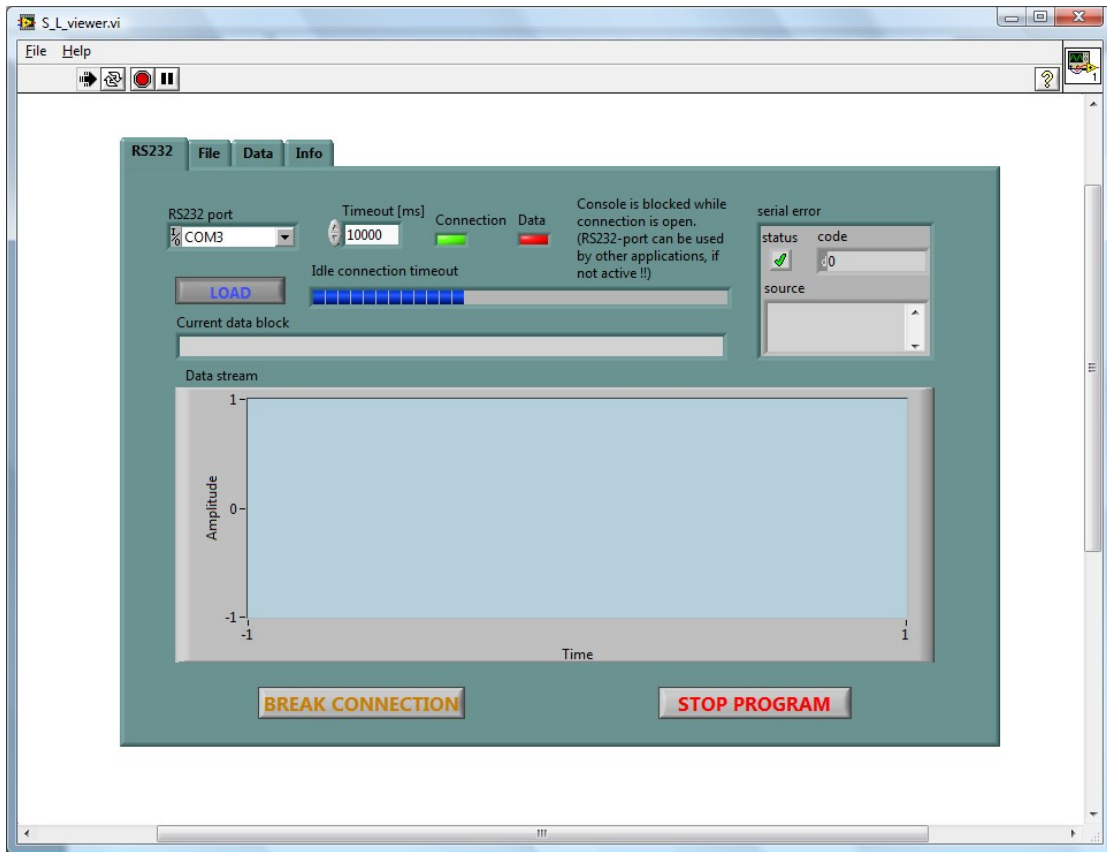


Fig. 16 : Pressing the “LOAD” button opens the RS232 connection for the duration that is determined by the parameter “Timeout [ms]”.

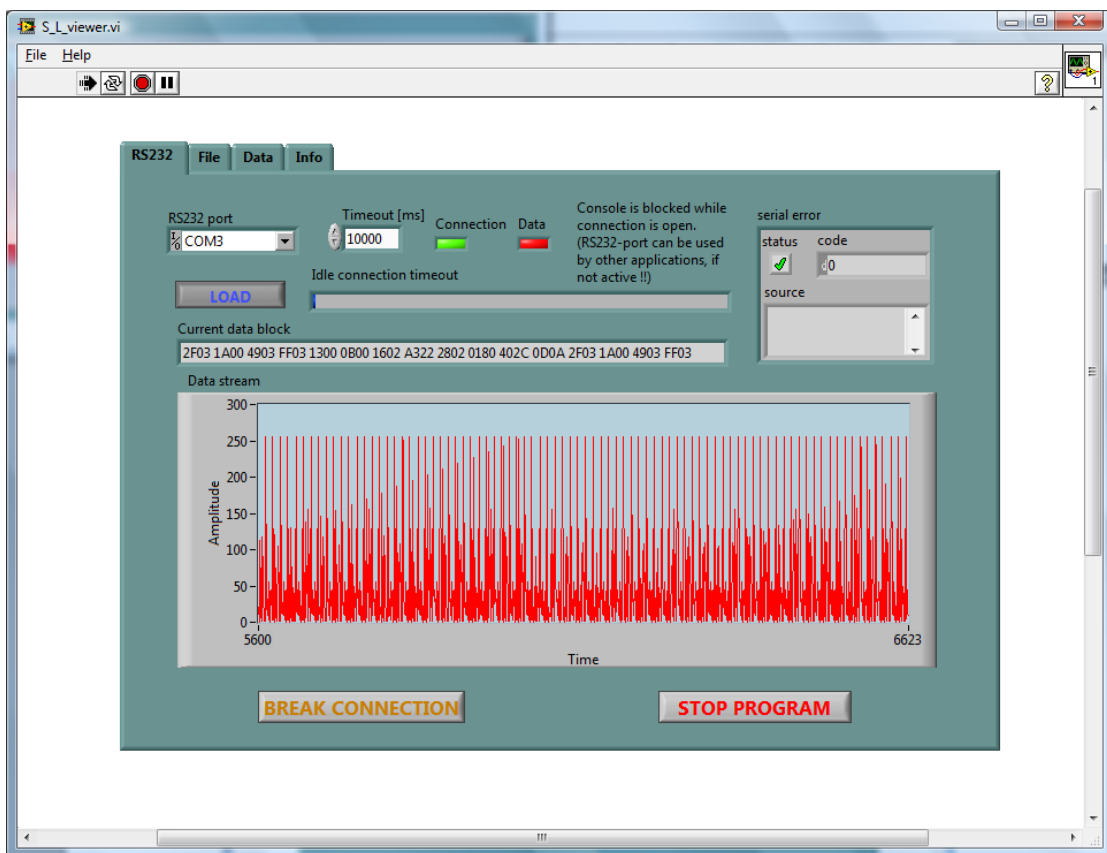


Fig. 17 : To indicate that the upload is correctly working, the data is made visible with a graph.

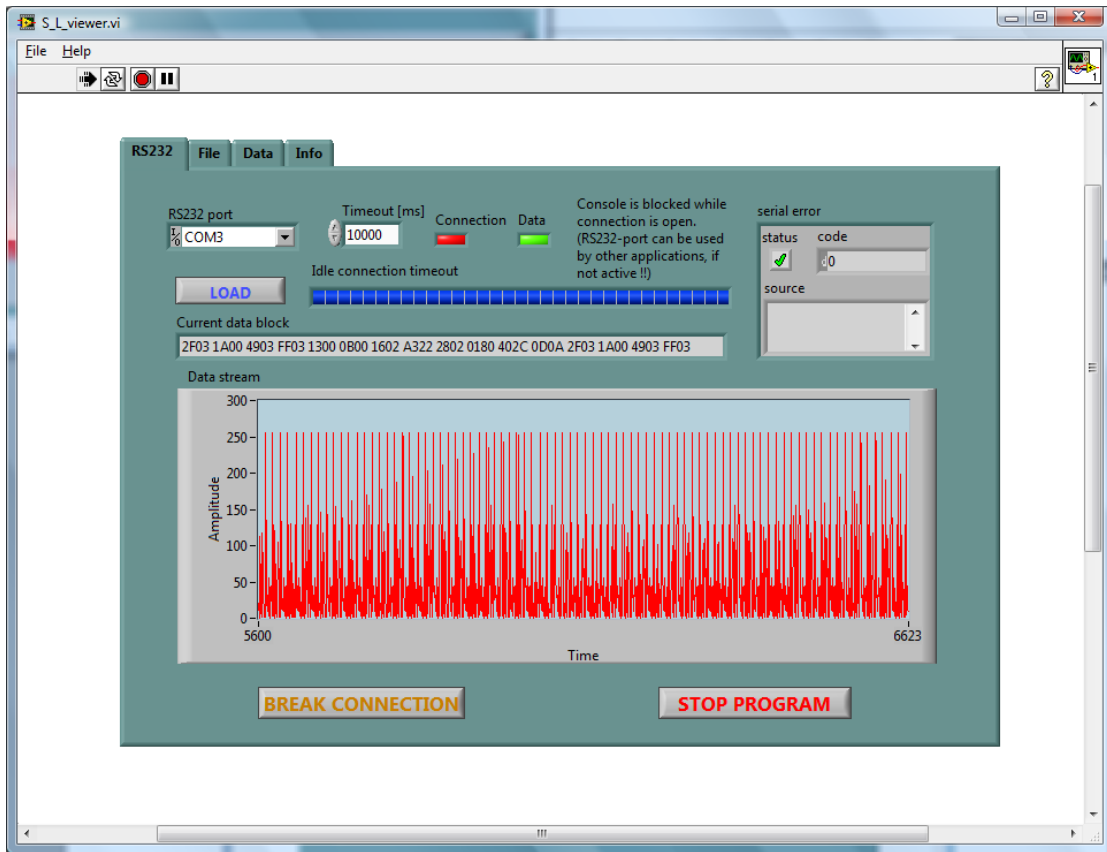


Fig. 18 : If the data upload is complete, the “Data” indicator changes its colour to green and the serial connection is broken with connection LED becoming red.

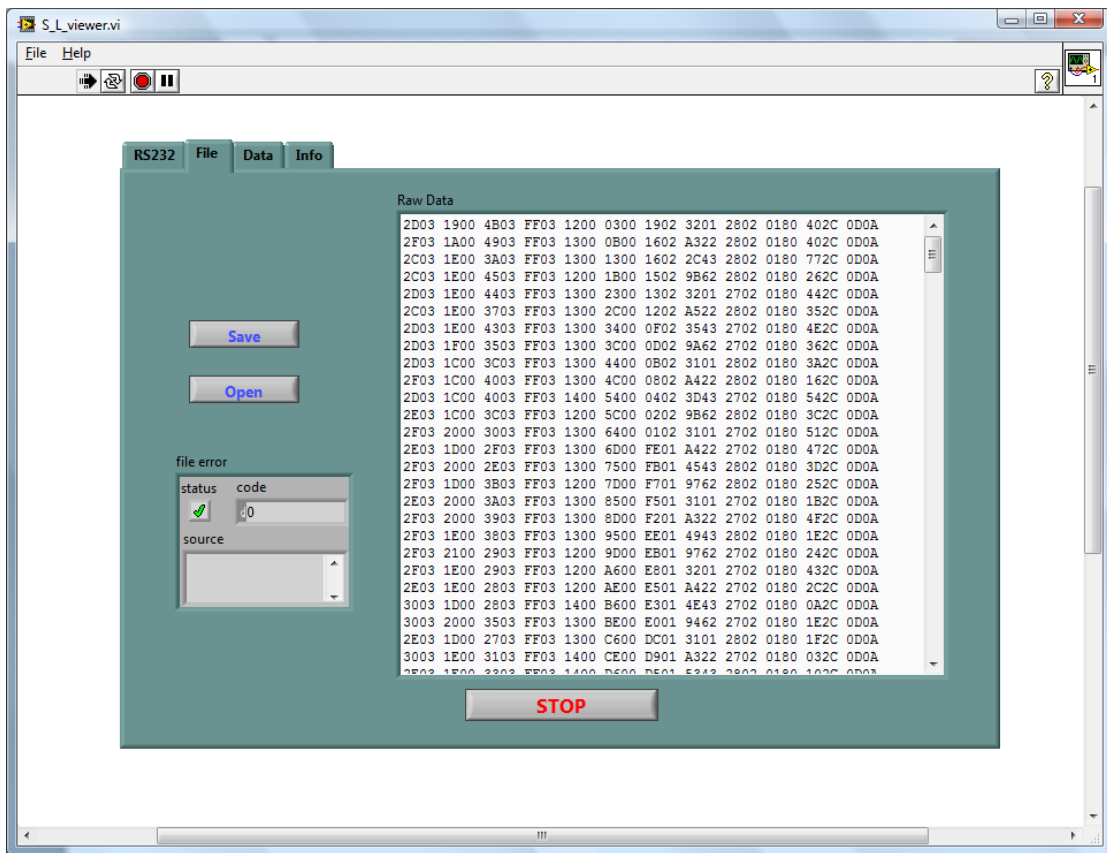


Fig. 19 : This tab-page allows to save the raw data from LUXPAK to file and retrieve it, if necessary.

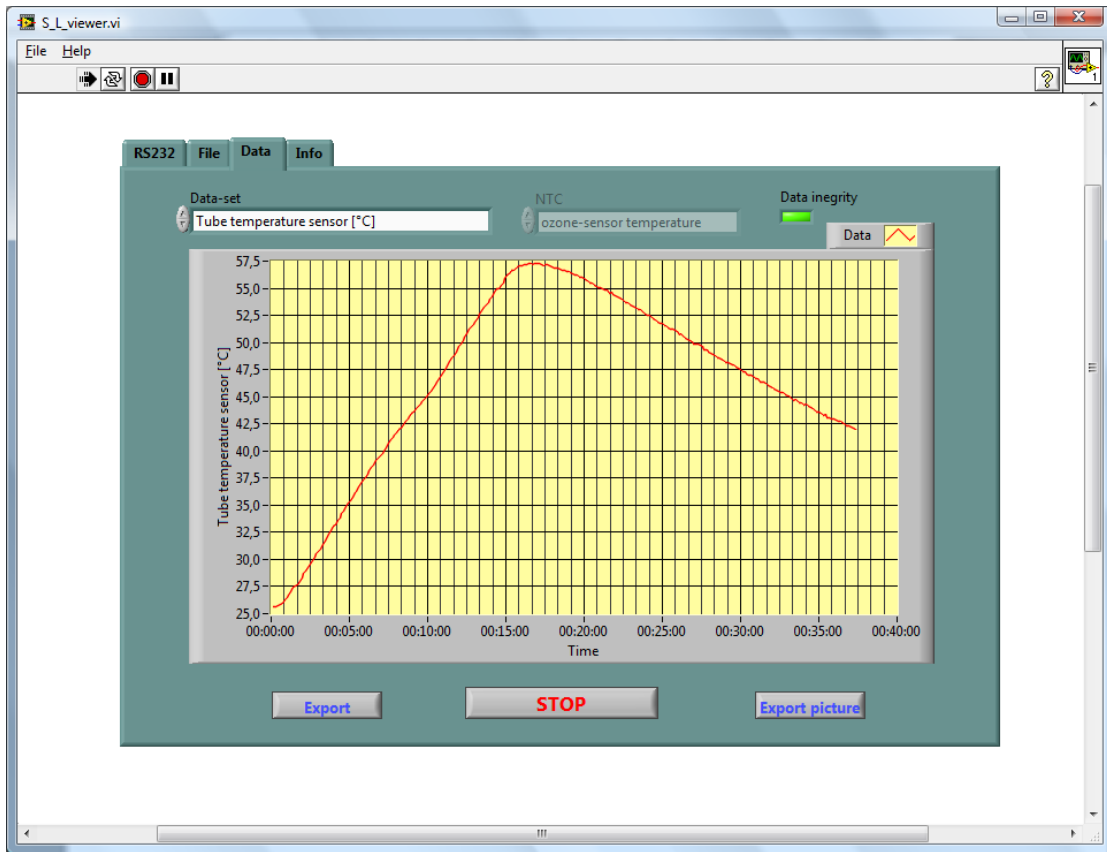


Fig. 20 : With the "Data" tab-page, every logged data sets can be consulted in graph-form.

Annexe A: Troubleshooting

I. Half an hour before launch troubles

1. LUXPAK doesn't switch on

Symptoms:

- The red LED doesn't start blinking
- The RCX inside the container doesn't send the characteristic RCX "beep beep" acoustical signal

Possible causes :

- Bad batteries → replace the batteries
- Battery polarity error
- Main battery connector not correctly fixed
- Loose SNOOP_LOG connections on SNOOP_LOG (contact the LUXPAK team)

2. LUXPAK doesn't boot

Symptoms:

- The red LED doesn't stop blinking during more than 5 minutes
- The yellow LED doesn't go on
- No characteristic RCX "sweep up" sound, no following five 1kHz long beeps, no following "descending sweep" sound are heard

Possible causes:

- Fatal error → consult the LUXPAK team, there must have happened something very serious.

3. LUXPAK boots with warnings

Symptoms:

- After the five long beeps, the RCX notifies that an error happened so far by sending out three "buzz" sounds.
- The green LED blinks a few times (if the "**REMOVE BEFORE LAUNCH**" panel is well in place, the green LED blinks only weakly.)
- The RCX display shows the message "err N"

Possible errors N=1..9 :

1. One of the 4 RCX buttons is pressed: → Something is blocking the RCX buttons. Open the container and free the button.
2. **REMOVE BEFORE LAUNCH** panel removed or bad in place: → The panel should strongly press down the touch-sensor
3. The "GASPERI" multiplexer does not work correctly; the RCX cannot find the G_Port0 that is essential for synchronization: → This error is a warning only. After a few cycles, normally G_Port0 is always found, assumed the connections are OK.

4. Tube temperature sensors value out of the allowed range: → check the Sensor1 connection
5. G_Port1 : bad value from the ozone NTC sensor: → contact the LUXPAK team
6. G_Port2 : bad value from the battery NTC sensor: → contact the LUXPAK team
7. G_Port3 : bad value from the Mootz_board NTC sensor: → contact the LUXPAK team
8. The “GASPERI” board did not end on G_Port0 after the selftest: → ignore this error
9. LUXPAK was started with weak batteries: → replace the batteries.

Hint:

- After having notified one of these warnings the RCX program continues as if nothing happened. If the operators want to intervene for any of these errors, it is an excellent idea to manually switch off the RCX, wait 3 seconds and switch on and off LUXPAK with the bug fixed. In this case, the RCX will not lose the firmware and 5 minutes waiting are avoided.

II. Moment of launch troubles

LUXPAK doesn't start the datalogger

Symptoms:

- The green LED doesn't light up as the “**REMOVE BEFORE LAUNCH**” panel is removed. The red LED doesn't start flashing every 10 seconds. The “chirp” sound (“blip, blip”) is not heard at start.

Possible causes:

- Fatal error → consult the LUXPAK team, there must have happened something very serious.

III. Upload troubles

LUXPAK doesn't upload any data if the RCX PRGM-button is being pressed

Symptoms:

- No data stream is visible on the **S_L_VIEWER.vi** front panel
- No serial connection error is visible on the screen.
- LUXPAK is correctly wired to a COM port.

Possible causes:

- Bad COM port → select a valid port
- Another application is assigned the COM-port (This may especially happen, if LabVIEW8.1 is opened together with ROBOLAB. → Close the disturbing application.)

- An upload is still running → wait a few minutes and press the RCX PRGM-button again while the **S_L_VIEWER.vi** has set up a valid connection that did not timeout.
- If the upload process is “warm” started from the fully running LUXPAK program –datalogging included-, pressing the PRGM button will stop the datalogging process and upload the data. After this, a special feature was added to the firmware to give LUXPAK the possibility to resume datalogging by pressing the RUN-button. This was necessary for the many tests during the development. However the actual RCX firmware v.27 does not allow the upload to be repeated unless the datalogger is running again. Since the data pointer is not reset during this procedure, the system time continues running and new data is appended with correct system time.
- If the upload is “cold” started, while LUXPAK is completely rebooted with the **“REMOVE BEFORE LAUNCH”** panel in place, the upload process can be repeated as many times as desired without the need of touching the RUN button.
- For any other cause, contact the LUXPAK team.

IV. Datalogger reset procedure

- a. Open the LUXPAK container as shown on Fig. 7 (section 2 “Install the batteries”).
- b. Take off the **“REMOVE BEFORE LAUNCH”** panel.
- c. Switch on LUXPAK
- d. Wait 5 minutes to give the bootloader the time to install and run the firmware on the RCX.
- e. Ignore the warning state (“buzz” etc, cf. section I. 3.)
- f. Press the green RCX RUN-button and the PRGM at the same time (RUN-button first)
- g. Now LUXPAK executes the internal reset of the EEPROM data-pointer. During this process, the RCX sends out a few clicks. The EEPROM is not erased, only the data-pointer is set to zero.
- h. If this procedure was accidentally launched, switch off LUXPAK and send it back to the LUXPAK team, which will be able to restore the data.
- i. After the reset, LUXPAK buzzes and flashes all the LEDs and waits for a reboot.
- j. Replace the **“REMOVE BEFORE LAUNCH”** panel.
- k. In order not to loose the RCX firmware, the RCX can be switched off by pressing its red ON/OFF button. Then turn off and on LUXPAK with the main switch. The RCX will automatically be run by the bootloader system. Otherwise you may also switch off the main button and turn the system on when desired. If the datalogger is started now, old data will be overwritten.