Galleryzone - Manual

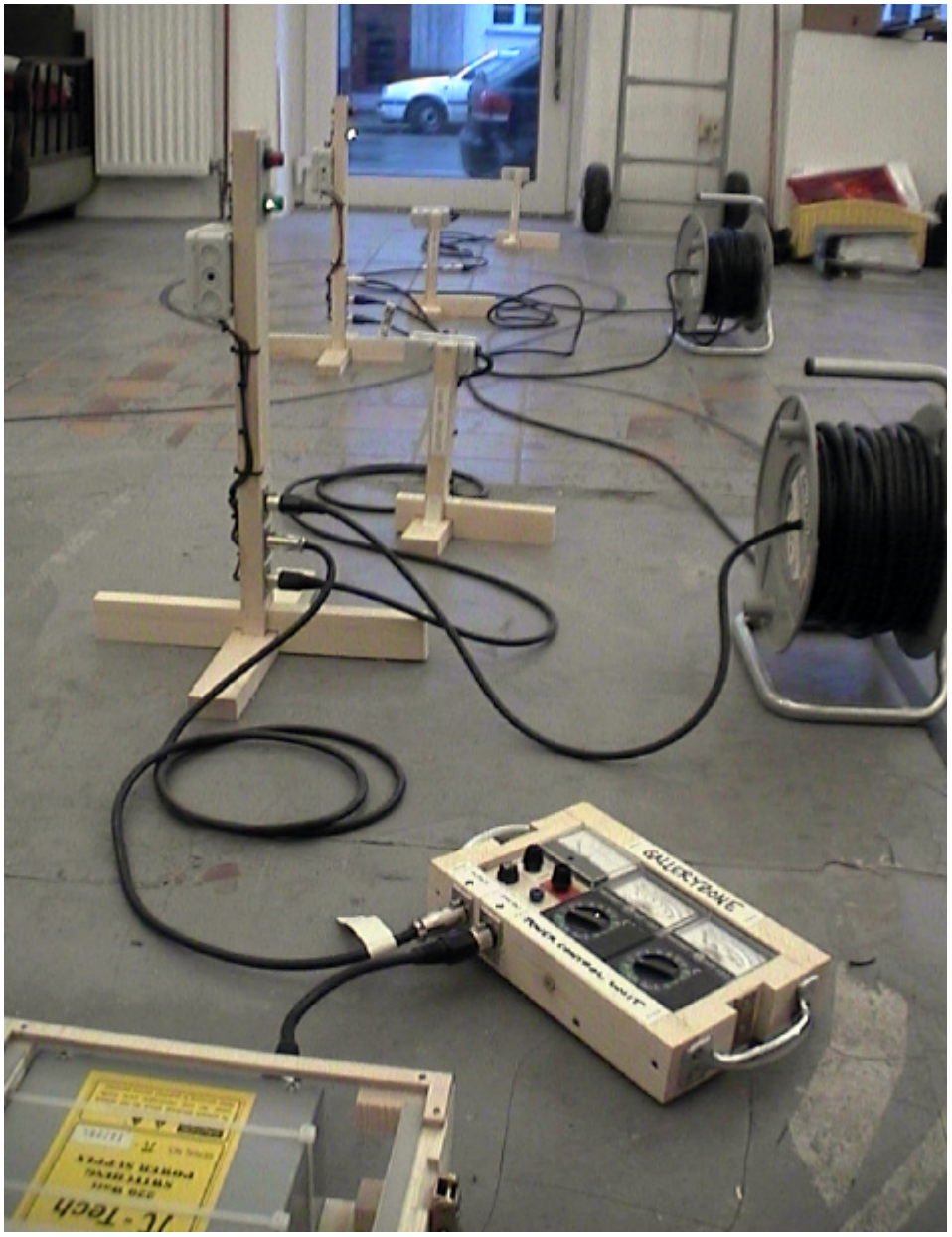
Version from 3.1.2007 by Niklas Roy

Galleryzone is the main safety feature of any Gallerydrive.
In an exhibition with more than one car involved, it prevents the cars from crashing into each other.

The system is built like it was proposed in the PDF from 25.8.2006. The only difference to the proposal is, that trafficlight, zone controller and infrared transmitter are physically one device, now. To get more detailed information about how the system works, please also read this former proposal!

This manual contains:

1. **How to connect and to set up the zone system**
2. **How the communication works**
3. **Debugging and calibrating**
4. **The queue controller**



1. How to connect and to set up the zone system

The zone setup is a linear connection of devices. It starts with the power supply unit and ends with the last laser barrier. In between, there are the zone controllers and the according laser barriers.

To start, you first set up the power supply, close to the point, where the visitors enter the car. The first device, that will be connected to the power supply is the first zone controller. It does not matter, which of the zone controllers you use, since they can all be interchanged. However, it is important, that you stick the RFID-tag which belongs to this controller next to it on the track. Each zone controller has its own RFID-tag, don't mix them!

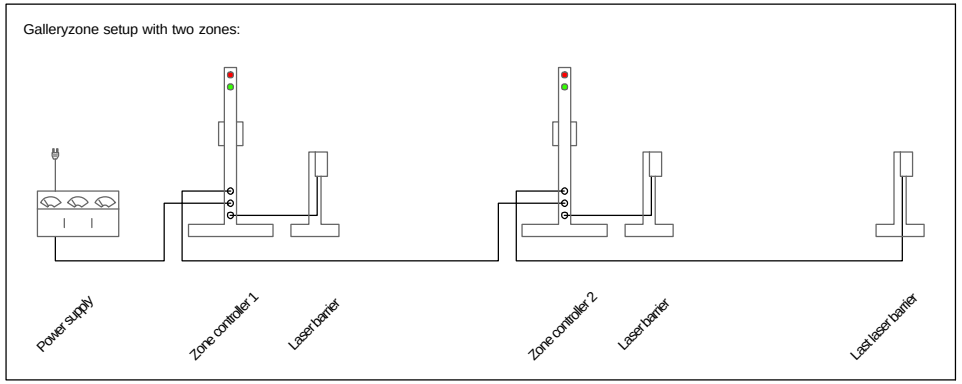
When the car rolls over the RFID tag, it knows, that it enters a zone and that it has to wait for a certain "go" signal. For safety reasons, every zone controller sends a slightly different "go" signal (address:6, signal:1 or address:6, signal:2 ...) and due to the unique RFID, the car knows for which "go" signal it has to wait.

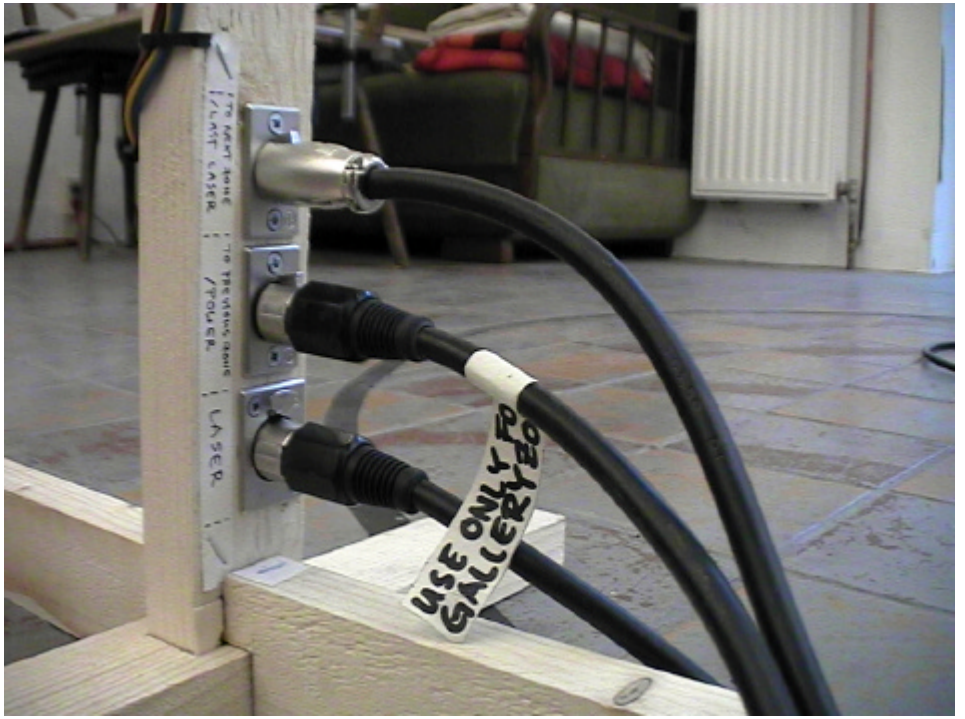
To connect the power to the first zone controller, use the XLR socket in the middle of the controller (it is labeled with "To prev. zone / Power").
Then, you have to connect the laser barrier to the zone controller. The laser barrier has to be placed about 1,5m behind the zone controller. The laser barrier is plugged into the lowest XLR socket (labeled with "Laser").

Each zone ends with either the next zone, or with the last laser (if it is the last zone). Use one of the cable drums or another long cable, and connect it with the XLR socket on top (labeled with "To next zone / last laser").

If it is the last zone, you can simply connect a laser at the other side of the long cable. The last laser has to be placed behind the queue controller, exactly in front of the queue.

If there is another zone following, you plug the other side of the cable into the middle XLR socket of the following zone controller (it is labeled with "To prev. zone / Power").





2. How the communication works

Each zone can have either the condition "occupied", or "empty". If a zone is occupied, it will display this with the red light. If it is empty, it is continously sending "go" signals via infrared and it displays this also with the green lamp.
If a car rolls over a RFID tag, related to a zone controller, it expects to receive this certain "go" signal. If it does not receive this signal, it will stop and wait until it receives it.

As mentioned before, the currently used "go" signals are the following RC5-codes:

address:6 - signal:1
address:6 - signal 2

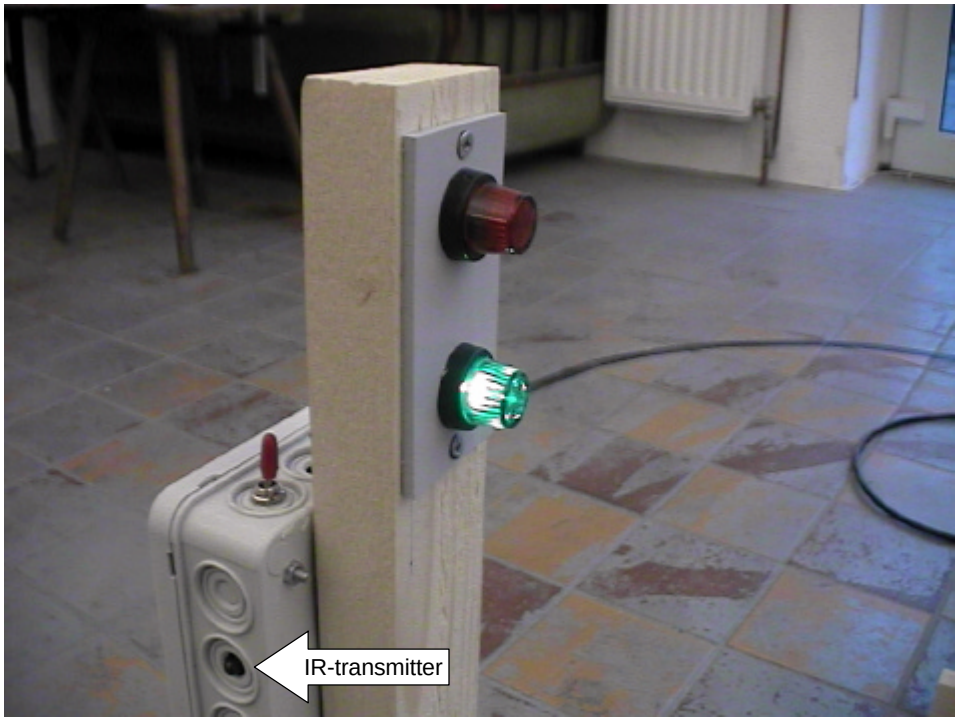
For further zone controllers, I propose to go on with address:6 - signal:3 ...

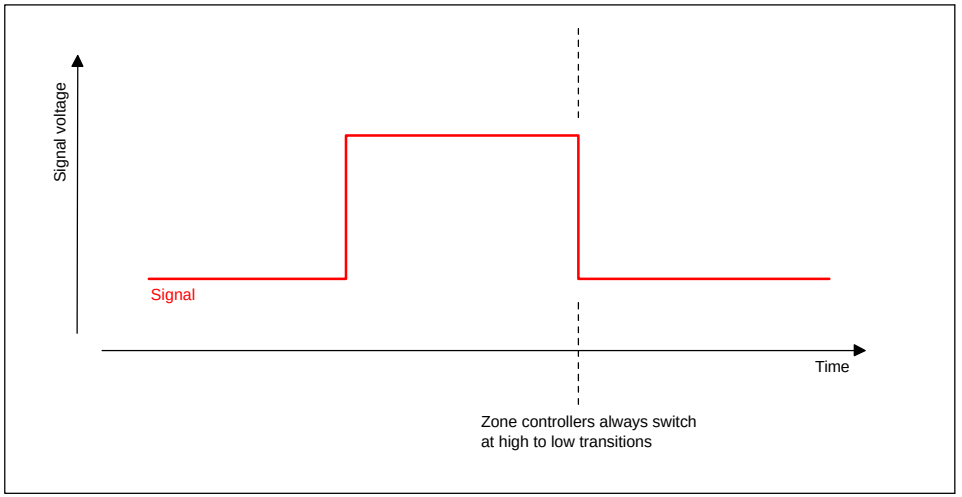
The reason, why all zone controllers have to use different "go" signals is, that otherwise it could happen, that a car waits at controller A for a "go". But zone A is occupied and its controller doesn't send a go. But if zone B is empty, its controller would send a go. And if zone controller B is too close to the car, the car could receive this "go" even if it is not intented for it.

If a car enters a zone, the first laser detects the retroreflecting tape on the car. As long as the laser points onto this reflector, there will be a voltage peak on the signal line. As soon as the laser does not point anymore at the reflector, the signal voltage goes back to its normal (low) level. This is the point, where the zone controller switches into the "occupied" condition.

When the car enters a zone, it also means, that it leaves the previous zone. So the zone controller switches for one second 5V on the signal line, which which is connected with the previous controller. When the voltage goes back to 0V, the previous controller will put itself into the "empty" condition.

If the controller is the last zone controller, it gets the signal, which sets it back into the "empty" condition by a last laser barrier. This works like the same: The reflector of a passing car will switch the voltage on the signal line. When the voltage goes back to the low level, the zone sets itself into an "empty" condition.

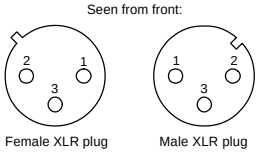




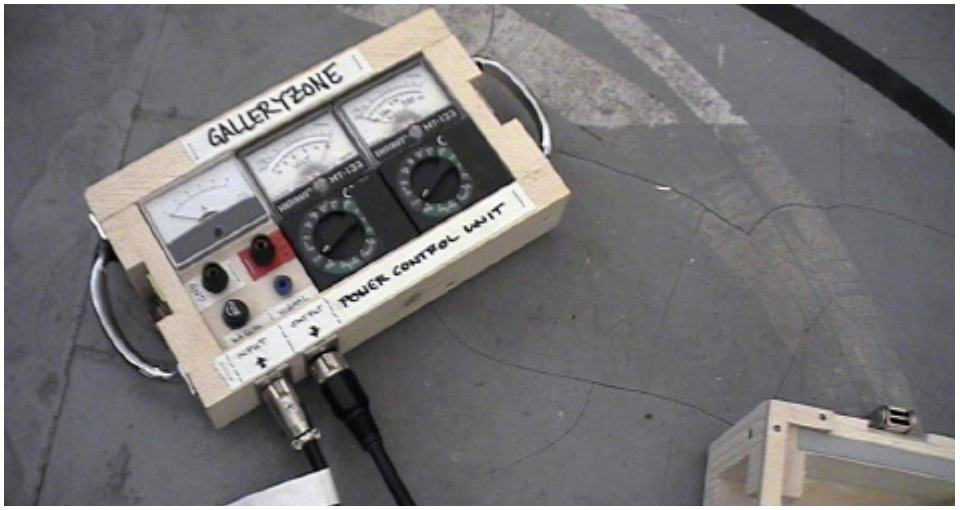
3. Debugging and calibrating

All devices are connected with three wires by a three pin XLR plug. This provides all devices with power and transmits the signals between all the parts.

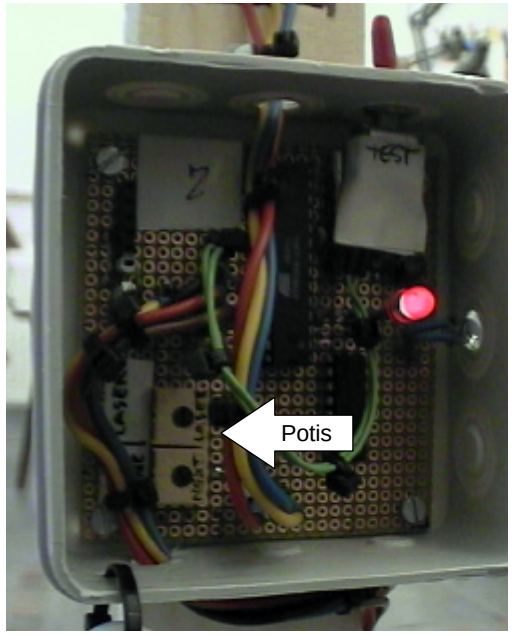
Pin 1 is always GND
Pin 2 is always +5V
Pin 3 is always the signal line



To debug the system, the "Power control unit" can be detached from the power supply. You can plug this device between any other cables to find out, which voltage is on the power supply line and which voltage is on the signal line. You can also find out the amp consumption of the devices behind the control unit, with the built in amp-metre.



Since the laser barriers work entirely analogue, they don't deliver exact 0V/5V levels, when the reflector of a car passes.
This makes it important to adjust the zone controllers to the connected laser barriers. Each zone controller has a switch, marked with "test".
Put this switch into the "test" mode to adjust the controller. You can see, if a controller is in the test mode, by the sblinking status led. If the status led is continously on, the zone controller runs in normal mode. During test mode, the controller will not send any infrared signals.



If you open the controllers cabinet, you will see two potis. One is for adjusting the "laser" input, the other is for adjusting the "last laser" or "next" input. Start with adjusting the laser input. The red light has to glow, when you hold a reflector in front of the laser and it has to go off, if there's no reflector in it's laser beam.
After that, you can adjust the "last laser" or "next" input. The green lamp has to glow, if there's a reflector in front of the last laser (only if this is the last zone controller) - it has to go off, if there's no reflector in its beam.
During the test mode, the controller sends continously alternating 0V / 5V signals to the previous controller. This means, that the green light of the previous controller has to blink, if the previous controller is also running in test mode.

4. The queue controller

The queue controller is the only Galleryzone device, which is not part of the linear connection of devices. It has its own 220V power supply.
The queue controller has an according RFID-tag.

The queue controller and the belonging RFID-tag are placed at the end of the ride, inside the last zone. At this point, the car will stop at the RFID-tag. This is the situation, where a Gallerydrive service staff member helps the visitor out of the car. And after pushing the button on the queue controller, the car starts to go on slowly, it leaves the last zone and queues behind other waiting cars.

The currently used queue controller has an additional useful feature:
On its LCD, it will display the actual battery voltage of the car, and the lowest battery voltage during the last ride. So, the service team knows, when to change the cars batteries