	<b><i>oXigen system</i></b>	Doc.
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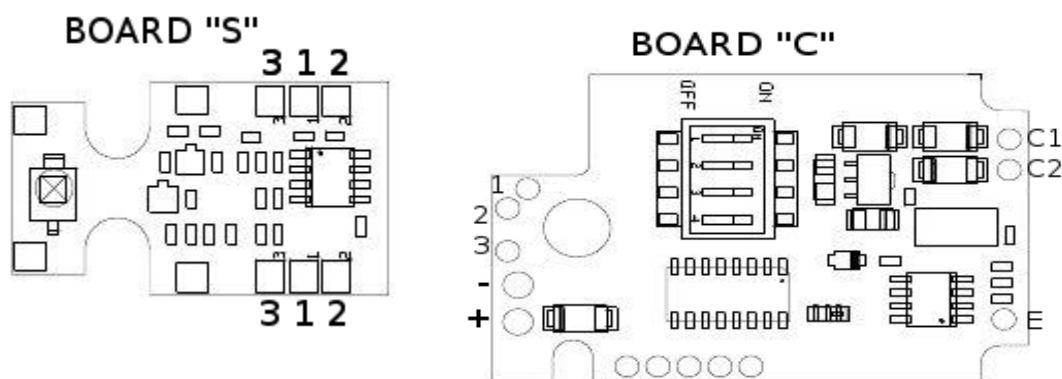


*O2 lane change driver* is the lane change driver board for digital slot racing, designed by *Slot.it*.


This circuit has been developed to be installed on each type of lane changer piece of track (simple, X, pit-lane entry, ) built by *Ninco* and *Carrera*. One *Slot.it* circuit can control one single lane exchanger coil; with an X type of lane changer, two *Slot.it* drivers must be used. From now on, the lane changer will be referred to as LC.

Proceed performing the following steps:

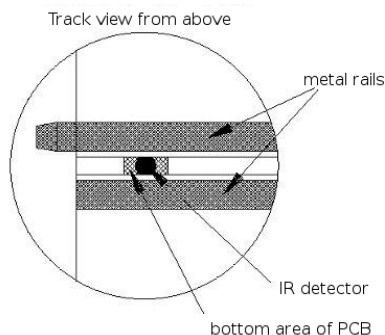
- 1 – remove the bottom cover from the original track where you plan to upgrade the LC to the Slot.it unit;
- 2 – remove the original electronic board and all its electrical connections, except for the coil, whose cables must be desoldered from the original board, or cut as close as the original board as possible (in other words: leave long wires); read 'important notes' point 5.
- 3 – board C and board S (see below) must be joined with the provided cables. Board S has two sets of pins that can be used, depending on the 'hand' (right, left) of installation in the LC, numbered from 1 to 3



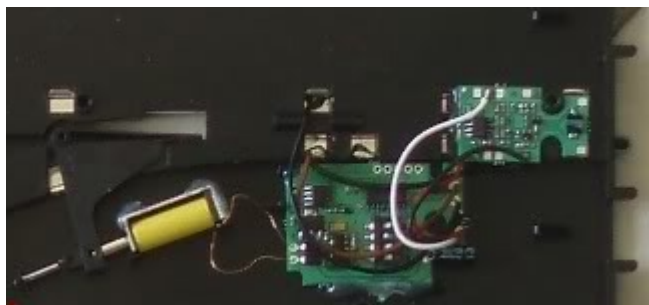
Board 'C'	To
Pad '1'	Pad '1' Board 'S'
Pad '2'	Pad '2' Board 'S'
Pad '3'	Pad '3' Board 'S'
Pad '-'	Track ground rail (in general, right rail, but may vary depending on your system)
Pad '+'	Track live rail (in general, left rail, but may vary depending on your system)
Pad 'C1'	1st coil terminal
Pad 'C2'	2nd coil terminal
Pad 'E'	Not used for oXigen

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4 – glue the board 'S' so that the sensor area of the sensor chip (the “black dot”), on the bottom side of the board, is placed between rails, at the beginning of the LC track section, according to the following picture.




Beware: if you look at the bottom side of the track, the component side of the sensor board must be visible.



For *Ninco* track, the opening is already present; for *Carrera* track, drill a hole in the bottom of the slot. Make sure the IR detector is properly placed – you must be able to see it from above.

### Important notes:

1. Power supply polarity on Carrera track may be inverted compared to the generally accepted standard, which is + on the right, - on the left. Consider this when installing the oXigen digital IC inside your cars: you may need to invert the position of the two cables on the pick-up of the Oxygen cars or install a pick-up diode rectifier built by Slot.it.
2. On Ninco track a dead strip is present on the rails of the lane exchanger piece of track. For use with oXigen system the dead strip has to be electrically connected, using a piece of cable, to the nearby rail. This connection doesn't have to be made if the original lane changer is left in place and the O2 chip unit is used as driver for the coil (please refer to paragraph at the end of the sheet).
3. In order to supply power to the track, it's possible to use the original system power base (if you want to keep using your existing Ninco or Carrera digital system) or, preferably, an external power supply (remove the original power base in this case). Always use a suitable fuse, whose value depends on the type of power supply and the number of cars.
4. Coil wires (C1 and C2) do not have a specific polarity.
5. Coil wires coming from original solenoids are covered with a transparent insulating enamel, except the ends that were soldered to the original 'donor' board. Make sure, before soldering the wires to the Slot.it driver board, to remove the enamel (with a tip of a cutter), to expose the bare conductive copper, or use the same ends that were connected to the donor board, that in this case must have been desoldered and not cut.

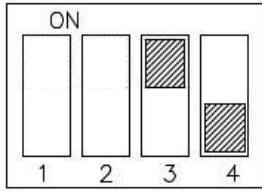




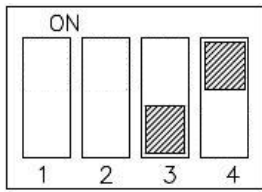




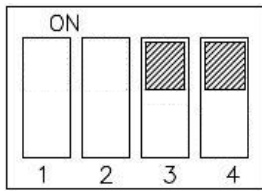




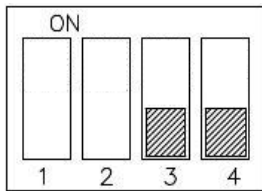




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## Lane Changer


### Setup

**IMPORTANT NOTE:** the position of the above said switches is only read once at power on. If the settings are changed, the driver must be power cycled for the changes to become effective.

oXigen can do the so called 'Selective Lane Changing', that is, change left or right depending on which button is pressed. The oXigen driver for the lane exchanger reacts according to Picture 2 below, showing what happens when a 'up' or 'down' button is pressed. Ignore for the moment dip switches 1 and 2.

Dip switch 3 and 4 position	SCP Arrow buttons	explanation
	 NO LANE CHANGE  CHANGE LANE  +  CHANGE LANE	3=on, 4=off change lane when 'down' arrow is pressed, or both arrows are pressed at once
	 CHANGE LANE  NO LANE CHANGE  +  CHANGE LANE	3=of, 4=on change lane when 'up' arrow is pressed or both arrows are pressed at once
	 CHANGE LANE  CHANGE LANE  +  CHANGE LANE	3=on, 4=on change lane any time an arrow is pressed. SSD compatible mode
	 NO LANE CHANGE  NO LANE CHANGE  +  NO LANE CHANGE	3=off, 4=off lane changing is disabled

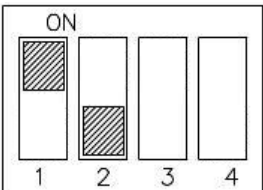
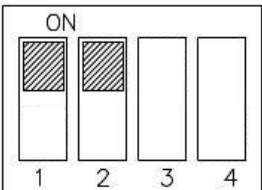
In other words, it works like this: The LC driver can be set to change lane only if one specific arrow is pressed. So, if, for example, the LC is set to change when the UP arrow is pressed, it will only switch lane when the UP arrow, or both, are pressed.


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It can be also seen from the table above that:

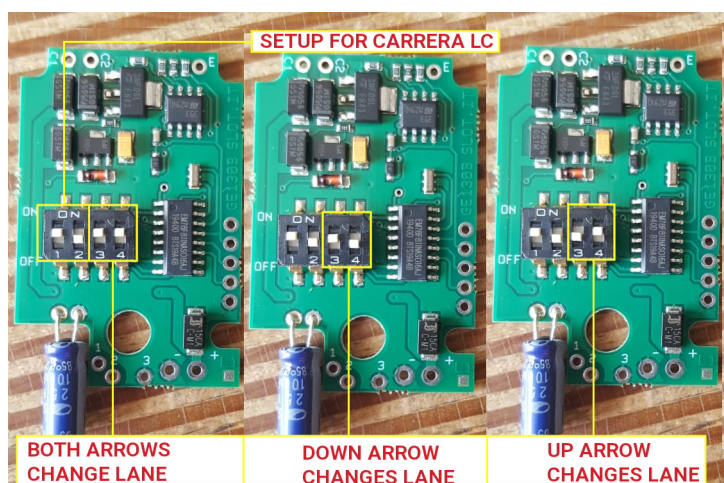
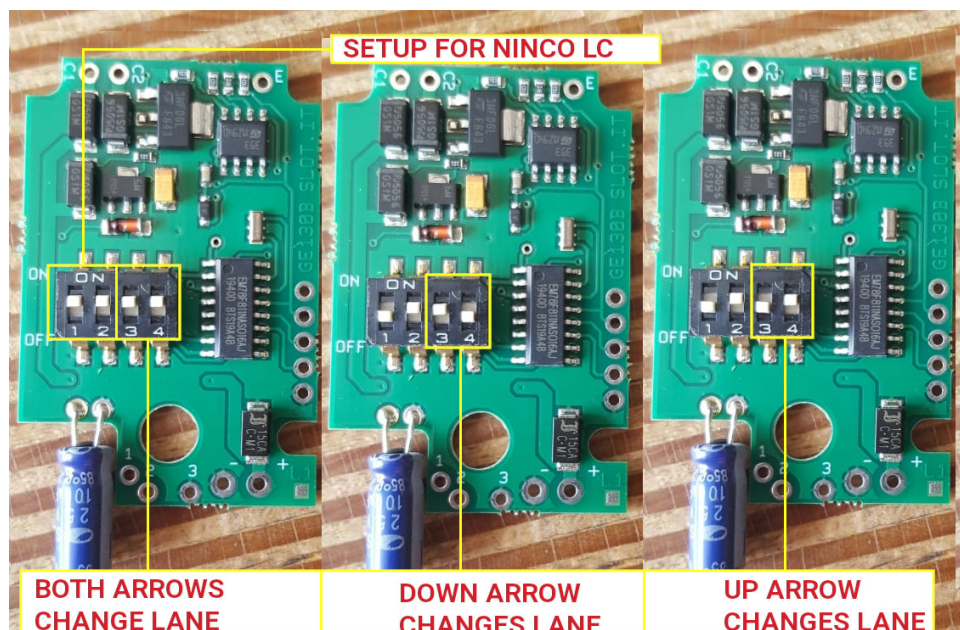
- a. Unless the LC is disabled, pressing both buttons together always triggers a lane change.
- b. set both switches to ON to make the LC compatible with SSD cars,


Now to switches 1 and 2: If you are replacing the electronic board of your Ninco or Carrera LC, set the dip switches number 1 and 2 as follows.

Carrera (ON time: 30ms)	Ninco (flipper activation time: 300ms)
	

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To summarize:

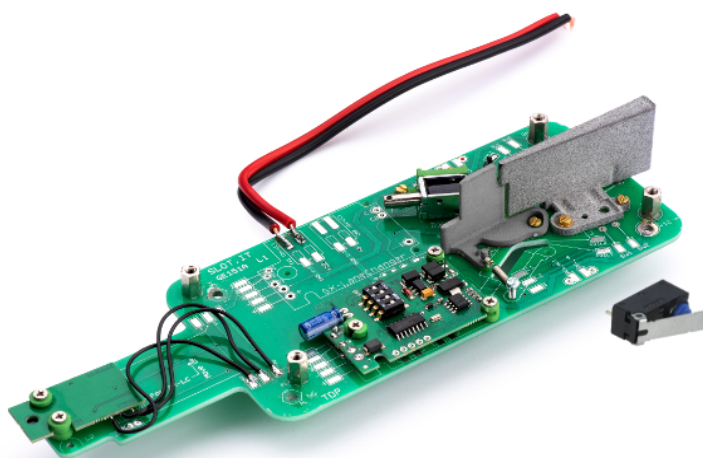
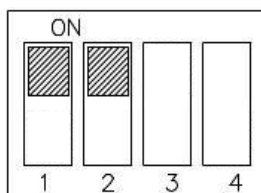


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	<p style="text-align: center;">Lane Changer</p>	<p>Pag. 6/ 9</p>

## Special Lane Changer for wooden tracks


A lane changer for wooden track, for the scratch builders, is also available (only directly from us). It is an advanced stand alone device, that can operate of the track's power (12V DC), and includes an optional lever switch that detects when a car that has requested to change lane crosses the LC.

For this type of LC, we recommend the following setup of the LC



The flipper maximum operating time is 300ms: it is shortened if a chasing car is detected and said car doesn't request a lane change, or if the optional switch is activated.

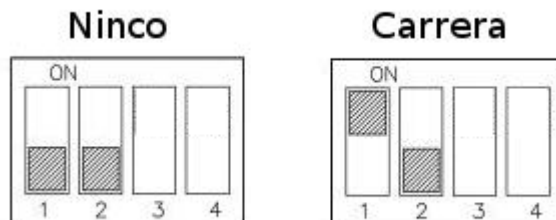


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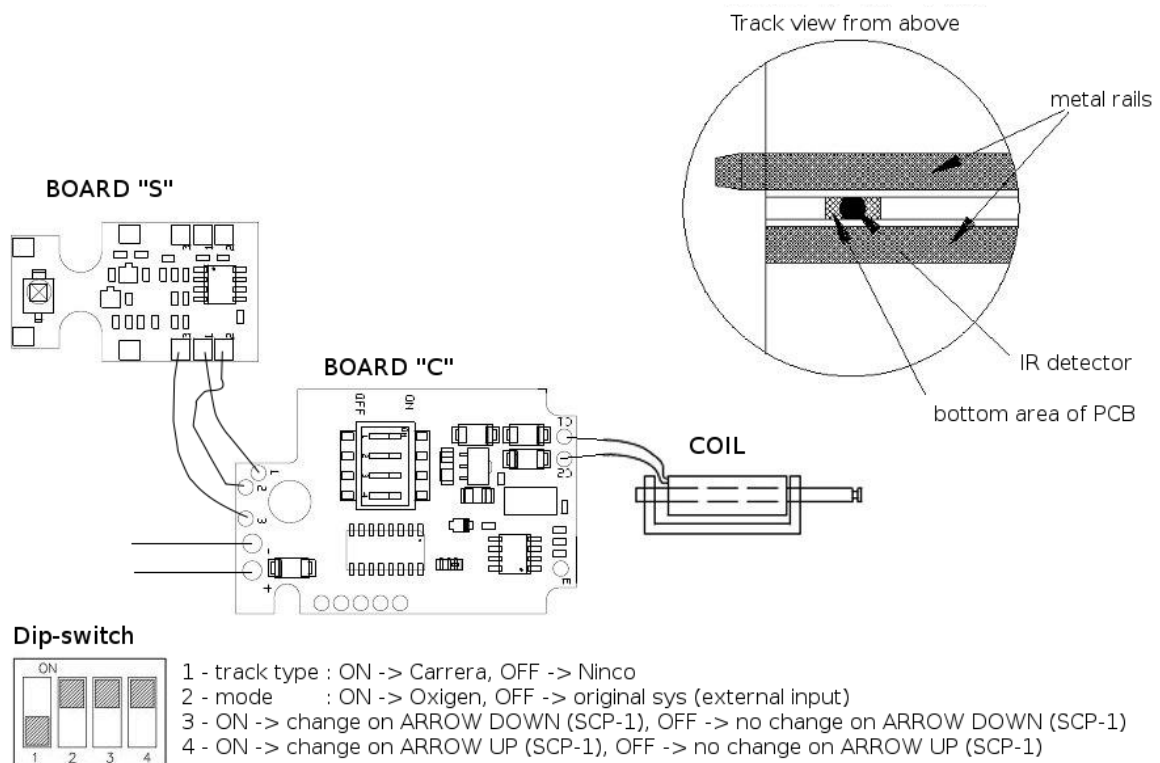
## Mixed digital environments


It's indeed possible to leave in place the original lane changer (Ninco, Carrera) and install it along the O2 unit.

To do this, the coil output (Ninco single LC: J3, Ninco X: J4 / J5; Carrera single LC: SOL1+, Carrera double LC: ???) has to be connected to Pad 'E' of the board 'C' of the Oxigen driver, whose installation must follow all that's been said so far, except for the dip switch setup on board 'C':



Use this DIP switch configuration *only* if you want to leave the original electronics in place, alongside oXigen's.



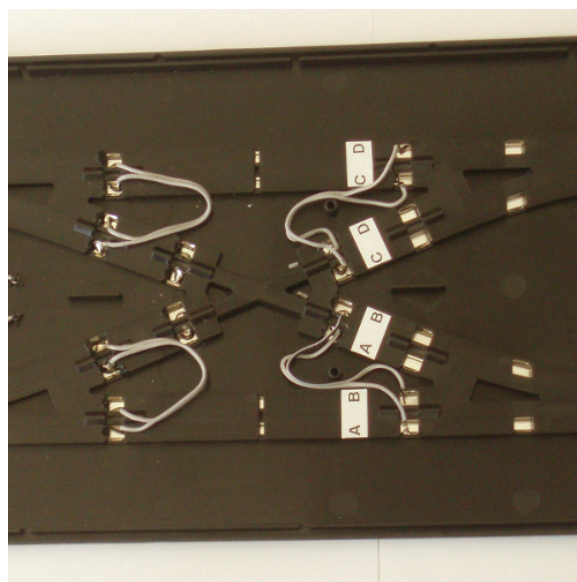
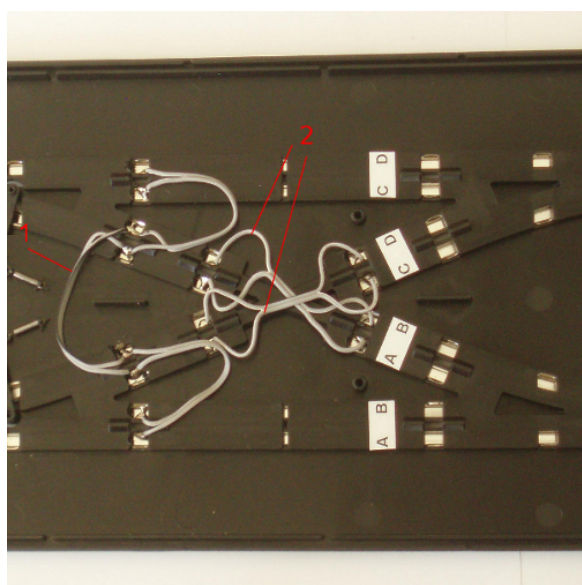
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### ***Ninco lane changer in a mixed analog+O2 environment***

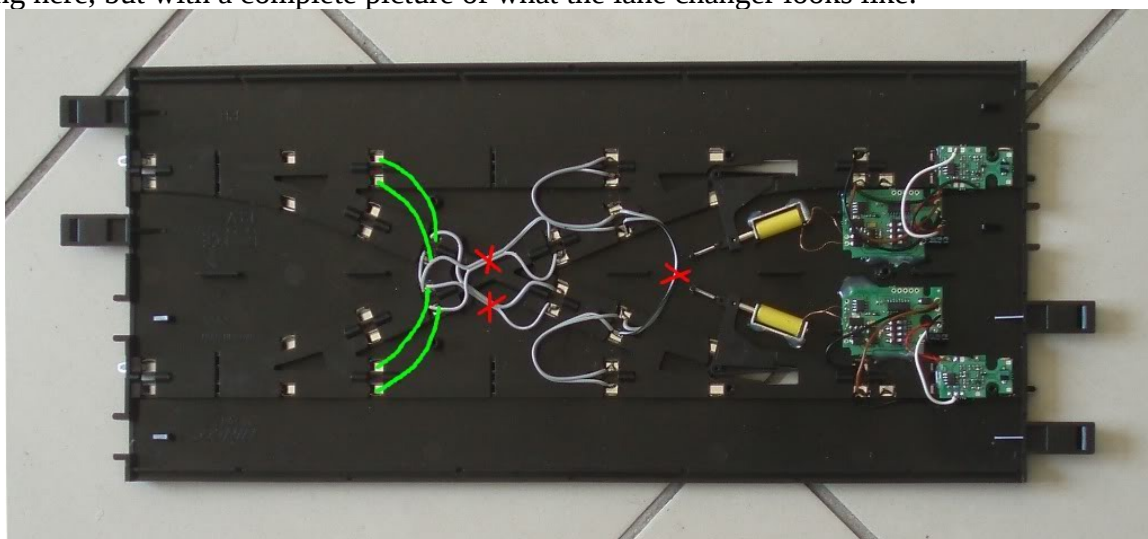
One of the greatest advantages of the oXigen system is the pacific and seamless existance of anaolg and oXigen digital. In other words, you can install the lane changers in your analog track, leave them in place, and use the track in analog mode as before.

In order to do this, however, you must make sure that your lane changers do not create a short circuit across the tracks - something that original (unmodified) LCs do.


For Ninco, remove and resolder the existing wires according to these pictures: wire '1' must be removed, wires '2' must be desoldered and resoldered according to the A,B,C,D letters: A goes with 'A', 'B' with 'B', and so on. Before and after:



Same thing here, but with a complete picture of what the lane changer looks like:





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### ***Power supply in a mixed analog+O2 environment***

If your planned circuit is going to be used in analog mode as well, especially with Carrera LCs, we suggest (recommend) using a separate power supply to feed all the oXigen LC boards. The reason is that we've noticed that from time to time, in analog mode only, the LCs switch to open. This is due to the continuous power on/power off cycles that the LC board is subject to in analog mode and is especially true if a Carrera digital 132 board is used as a feed to O2 LCs (to run Carrera 132 alongside oXigen). With Carrera LCs, any time the LC flips open it stays open until reset by one car crossing lanes - something that is clearly not desirable in analog mode. A separate power supply fixes any such issues forever.

### ***Technical data***

Operating voltage: 9 to 16 V

Solenoid opening time: 300ms Ninco mode, 30ms Carrera mode

Maximum solenoid load: 4A continuous