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Lane Changer

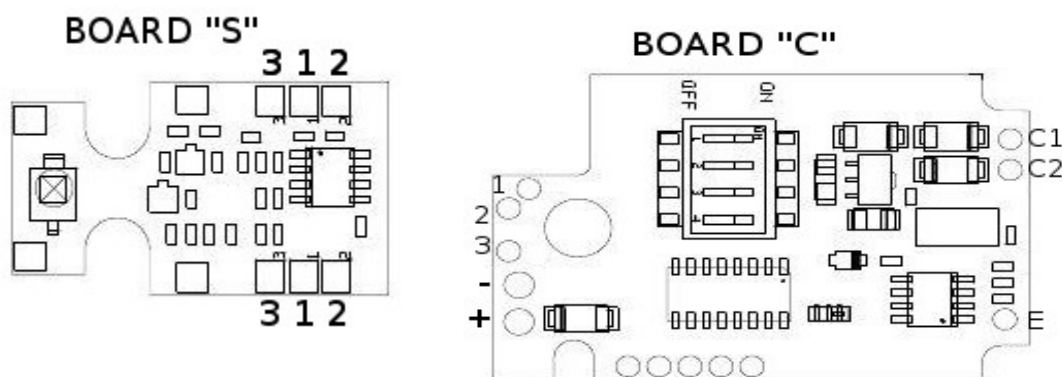


O2 lane change driver is the lane change driver board for digital slot racing, designed by *Slot.it*.

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:

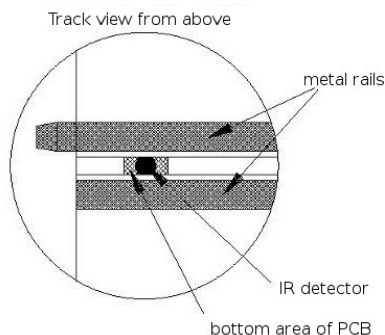
- 1 – remove the bottom cover from the original track where you plan to upgrade the LC to the Slot.it unit;
- 2 – remove the original electronic board and all its electrical connections, except for the coil, whose cables must be desoldered from the original board, or cut as close as the original board 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



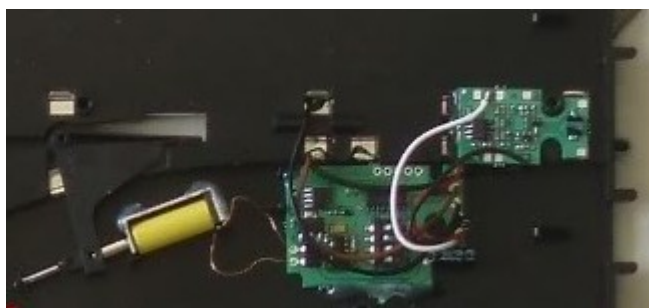
Board 'C'	To
Pad '1'	Pad '1' Board 'S'
Pad '2'	Pad '2' Board 'S'
Pad '3'	Pad '3' Board 'S'
Pad '-'	Track ground rail (in general, right rail, but may vary depending on your system)
Pad '+'	Track live rail (in general, left rail, but may vary depending on your system)
Pad 'C1'	1st coil terminal
Pad 'C2'	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.



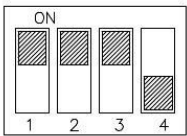
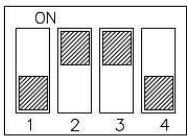
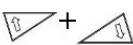
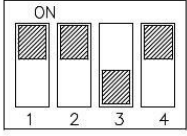
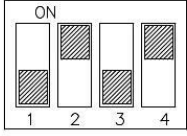
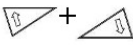
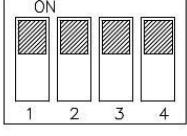
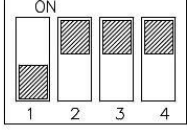
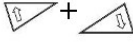
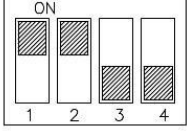
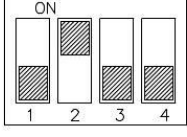
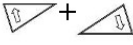
For *Ninco* track, the opening is already present; for *Carrera* track, drill a hole in the bottom of the slot. Make sure the IR detector is properly placed – you must be able to see it from above.

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.

Setup

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.

Carrera	Ninco	arrow buttons on SCP1		explanation
			NO LANE CHANGE	3=on, 4=off: change lane when 'down', or both buttons, are pressed
			CHANGE LANE	
			CHANGE LANE	
			CHANGE LANE	3=off, 4=on: change lane when 'up', or both buttons, are pressed
			NO LANE CHANGE	
			CHANGE LANE	
			CHANGE LANE	3=on, 4=on: change in any case when any of the buttons are pressed. SSD compatible mode
			CHANGE LANE	
			CHANGE LANE	
			NO LANE CHANGE	lane changer is disabled
			NO LANE CHANGE	
			NO LANE CHANGE	

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.

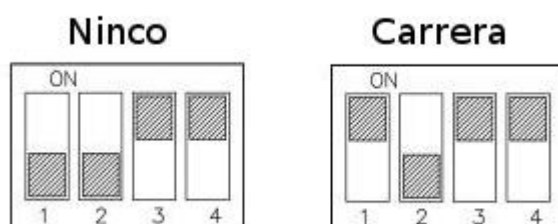
It can be also seen from the table above that:

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

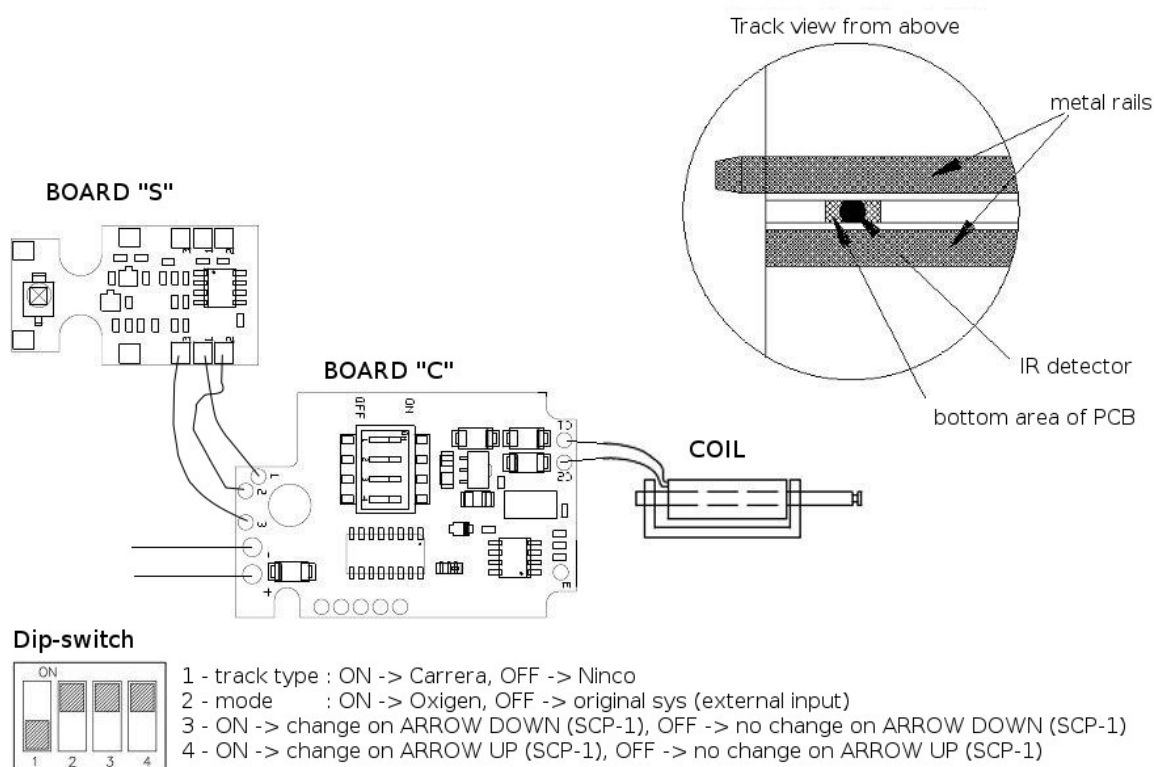
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It's indeed possible to leave in place the original lane changer (Ninco, Carrera) and install it along the O2 unit.

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 Oxygen 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.



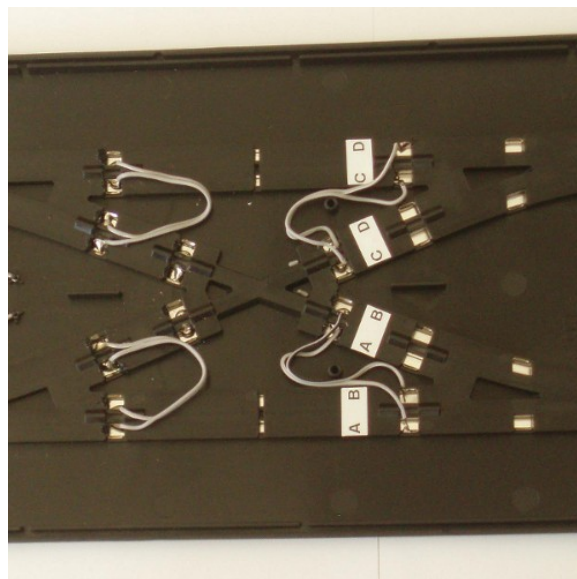
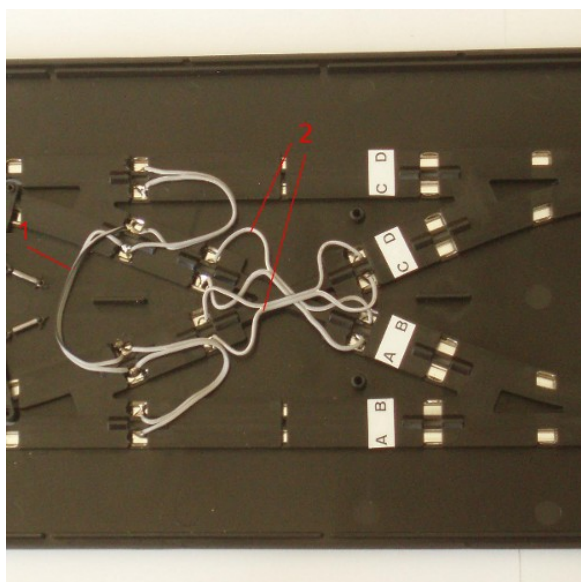
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Ninco lane changer in a mixed analog+O2 environment

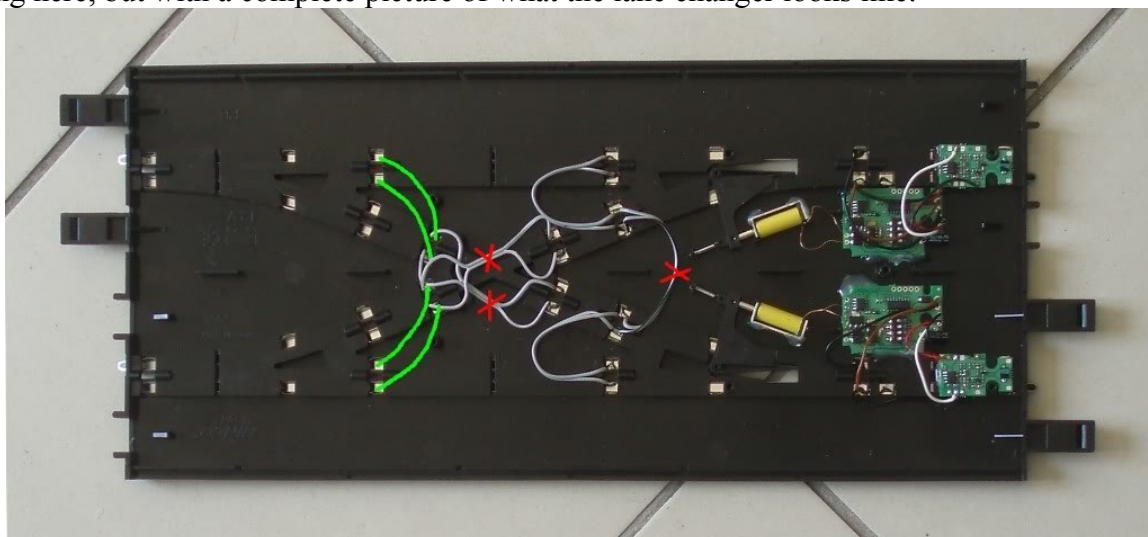
One of the greatest advantages of the oXigen system is the pacific and seamless existance of anaolg and oXigen digital. In other words, you can install the lane changers in your analog track, leave them in place, and use the track in analog mode as before.

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: 150ms Ninco mode, 30ms Carrera mode

Maximum solenoid load: 4A continuous