“Bridging the Gap”: Slot.it oXigen FAQ

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General questions

Q: what is oXigen?

A: The obvious answer is – an element of the periodic table, normally found in a bi-atomic (O2) form, wrongly spelled and written with the capital letter in the wrong place.... or, oxygen in Catalan (the language spoken in Catalunya). In the slot world, however, it is a revolutionary wireless control system for slot cars which bridges the gap between digital and analog.

Q: who is developing oXigen?

A: Galileo Engineering, the company known by the brand name 'Slot.it'. The same people who developed all the Slot.it cars and accessories, the SCP-1 and SCP-2 electronic controller in all its forms, the Live Timing box, and many other electronic stuff for toy companies in toys, industries and multimedia (Giochi Preziosi, Landi Renzo, IK Multimedia, and others).

Q: how many cars can run on the track at the same time?

A: Up to 20 cars per track in digital mode, or as many cars as lanes in analog.

Q: 'only' 20 cars?

A: Have you ever tried more than 20 cars on a track at one time? :) Technically, we could make more cars run on the same track, but feel that 20 cars per track for a maximum of 2 tracks with 20 cars each in the same wireless area is more than enough.

Q: How does oXigen work?

A: Traditional digital systems use the track rails to bring both the power and the control signals to the cars. This limits the number of cars because the more cars you want to run, the more current you must provide. However, sending control signals to cars through rails becomes increasingly difficult when large currents are involved, as it is the case with many cars. Besides, the control signals are transmitted in a very noisy environment (rails, braids, dirt, and electric arcing from motors) which complicates things further. The oXigen solution is: full power on rails, control signal from wireless 2.4GHz transceivers. So the cars get all the power they need when they need it, and the control signal stays clean.

Q: what do I need then for an O2 system?

A: First of all, a track, controllers and cars: we don't make tracks but we make fine slot cars and controllers. Then, you need at least oXigen in-car chips (O2IC), and SCP-1 or SCP-2 controllers fitted with oXigen cartridge module. If you already have the SCP, all you need is the cartridge: investment in the SCP controller is safe. With this setup you can run chipped cars as if they were analog cars. A complete digital setup requires a 'dongle', which is a 2.4GHz receiver attached on the USB port of the PC, and lane changers, that can be standard SSD lane changers, or Ninco or Carrera upgraded with the specific LC driver. A Finish Line is not indispensable!

Q: Can I really do without a Finish Line?

A: Yes. *O2 has now reached the ultimate goal of a digital track without a dedicated Finish Line but with fully working Finish Line and Pit Lane features*. We have devised a clever way to make the system work, count laps and lap times, detect pit lane entry, automatically reduce speed on pit lane, *without dedicated track hardware.* All it takes is placing appropriate magnets under the track, right where you want your FL and Pit Lane to be, and in no time you're up and racing. It works well and saves a lot of money and complexity in the setup of the track... besides, removing a dedicated finish

line has deep implication for *multi protocol racing*.Read below

Q: Does it have pit lane speed limit?

A: certainly. As soon as a car detects the pitlane it reduces its speed to whatever is the current pit lane speed. This feature comes basically free with the system. No specific electric hardware is necessary to make the pit-lane, except for the lane changers of course. The system is smart to the point that, once the pitlane entry is detected, even if you remove the car from the rails while in the pit lane, the speed limiting remains in place until the car leaves the pitlane.

Q: What power supply does it need?

A: An adjustable power supply with enough power to satisfy your needs. 9V to 18V with at least 1A per car is what we would recommend.

Q: Is a PC strictly needed?

A: For lap counting and race management in O2 mode, yes. Other operations, like programming the car ID, and running the car alone, do not need a PC. In SSD mode, a PB is all you need, provided the cars are in SSD compatibility mode.

Q: How do the cars get their ID programmed?

A: There is a simple specific procedure for the SCP-1: use the knobs to select the channels and program the car and the controller to a specific ID. The LED display on the controller shows the programmed ID. Alternatively, it can be done from the PC.

Q: Can the embedded software be reprogrammed in all the devices?

A: Certainly: reprogramming the software embedded in all the devices is of paramount importance, especially for a new technology like this one. New features can be added and software bugs can be removed throughout the life of the parts. All the components of the O2 system can be reprogrammed either through USB, in case of the 'PC dongle', or 'over the air', that is, by means of the 2.4GHz radio link.

Q: what do I need to transform the SCP-1 into a wireless controller for *any* system?

A: A complete SCP-1 with a standard oXigen cartridge, and an oXigen-SCP cartridge interface (CRI - Common Radio Interface). The oXigen cartridge is of course a completely standard unit which can be used inside an O2 environment.

Q: Does O2 support ghost cars? Refueling? Safety car? Drive through?

A: Yes to all:

Ghost: The SCP-1 already has a built-in ghost feature. We are also working on a controller-less, dongle-direct drive ghost car mode, to run your own ghost without the aid of a controller.

Fuel: The oXigen protocols allow individual setting of speed, braking, and lane changing for each car. This means that the PC can reduce top speed, or reduce braking, for each car to simulate a heavier car right after pit stop.

Drive through: You can even force penalties (drive through pit lane) or herd all cars back to the pit lane after racing. Pit lane speed and pace car mode speed are adjusted from RMS control panel.

Questions on compatibility

Q: can I still run my analog cars on the track, with my old controllers?

A: Certainly. O2 *bridges the gap,* it is100% compatible with your old analog track. Of course, to change lane, lane changers are necessary, but as long as they stay straight when lane changing is not requested, analog cars can be run along oXigen cars.
Not only that: the common interface CRI turns the SCP-1 for any supported system, into a wireless, untethered controller.

Q: What protocols is it compatible with?

A: Scalextric Hornby SSD, and Carrera digital 132. O2 chipped cars can race together with Carrera cars on Carrera 132 digital systems, or together with Scalextric SSD cars on Scalextric SSD systems, lane changing and lap counting included.
In both cases the power base cannot start/stop the cars. The compatibility is at the lane changing / car detection / lap counting level.
Read below for more information.
O2 is not compatible with SCX and Ninco digital.

Q: How can it work with Scalextric Sport Digital?

A:*oXigen is the only known commercial system compatible with Scalextric Sport Digital*.

It is possible to run an oXigen chipped car on Scalextric SSD, and race them together Scalextric SSD cars, lane changing and lap counting on the Power base, just like normal SSD cars. Thanks to an agreement with Hornby, the communication protocol between the car and the lane changer / lap counter is compatible with Hornby's own. Hence O2 can use existing box stock Scalextric Sport Digital LCs. Please refer to the 'Base Description Manual' for a detailed explanation.

Q: How can it work with Carrera Digital 132?

A:*oXigen is the only known commercial system compatible with Carrera Digital 1/32*.

It is possible to run an oXigen chipped car on Carrera Digital D132, and race them together with Carrera digital 132 cars, lane changing and lap counting as if they were Carrera cars. This is done independently of Carrera protocols and technology. Actually, it is the D132 PB that does the job for us. A fully working Carrera D132 system (PB + LCs + controller) is required. Please refer to the 'Base Description Manual' for a detailed explanation.

Q: Does it work with Ninco digital systems LC? or Carrera LC?

A: A custom, simple and cheap conversion electronic board is available for these systems: it is a effective, smart, lane changer board which replaces or even works side by side with the existing lane changer driver: in other words, if you want to convert your LCs to work with oXigen (or SSD) cars, just replace the existing electronic of your Ninco or Carrera LC. The board has been designed to replace the original electronics (fits in the same space) but can work in parallel with the original unit as well: this means the racer can run his existing system, switch to oXigen or SSD, and then back to the original digital system! (some rewiring is necessary, as SSD needs its own power base, and oXigen needs a DC power. However, it is possible to have a multi-protocol LC). Or, if so desired, race oXigen together with the 'other' digital system.

Q: What! Multi protocol racing?

A: Yes, it is possible to race in mixed environments with oXigen and Carrera digital, or oXigen and SSD. This is obviously be a major breakthrough for digital slot racing.

Q: So I can run SSD on other track made by other brands?

A: Yes. Just replace or complement the other brand's electronic LC board with oXigen's and hook up an SSD PB to the rails.

Q: Can I use O2 parts within SSD?

A: Yes, O2 Lane Changers are SSD compatible.

Q: is the RMS software available for anything other than MS Windows?

A: The software tool that we use for writing the RMS is available for Linux and Mac as well. Our company works mostly on Linux PCs, but the world doesn't, so we developed a Windows RMS version first. Hopefully we will also release Linux and Mac versions (at a certain point). Anyway, the base RMS may be open-sourced, and the dongle protocol is available free of charge to any RMS developers. As far as the PC is concerned, the dongle is only a serial port. Note that our software is only a basic, but robust, RMS system. We'll leave fancy features to the external developers.

Q: will any of the existing RMS programs be compatible with O2?

A: PcLapCounter supports oXigen. Others will follow.

Q: can I use my analog cars with O2?

A: On the same track, O2 can pacifically coexist with analog cars, but of course to run digital races with all that's involved you need to run the chipped cars. However, please read the "SCP-1 cartridge radio interface" section to see how O2 can turn any SCP-1 in a remote wireless controller.

Q: is O2 compatible with the Slot.it Live Timing (also known as Telemetry) Box

A: Yes: a Live Timing Box mounted on an oXigen SCP-1 in an oXigen world behaves just like a Live Timing Box mounted on an analog SCP-1 in a standard analog world. In addition, there is no need for the track interface box.

Hardware components: Start/Finish lines (FL)

Q: A system with no FL?

A: Yes. We have been able to reach this goal which *dramatically reduces cost and complexity*. You can place your finish line and pitlane wherever you want. Just place magnets where you want it to be. End of this paragraph and of finish line worries!

Hardware components: PC 2.4GHz interface (dongle)

Q: What is the 'dongle'?

A: a USB small key which plugs into any USB port and glues all the parts of the O2 system together with the SW running on the PC.

Q: is there a specific software?

A: Yes, the RMS sw speaks to the dongle which in turn speaks to the various parts of the O2 system: FL, LCs, and controllers.

Hardware components: Lane Changer driver (NCDB)

Q: what does it do?

A: It replaces or complements the original LC driver board in Ninco or Carrera lane changers, to adapt them to O2 and SSD lane changing protocols.It is necessary if you want to use oXigen or SSD on these other two tracks.

Q: what is it?

A: A small printed circuit board, shaped to fit exactly under the plastic cover of the abovesaid Lane Changers.

Hardware components: Lane changers (LC)

Q: can SSD Lane Changers be used?

A: For Scalextric Sport tracks, Hornby SSD Lane changers are a perfect first choice. Reliable and reasonably priced, they can also be integrated into Ninco tracks by commercial Ninco and Scalextric track adaptors.

Q: how is the car detected?

A: By decoding the LED code

Q: can LCs from other makers be used?

A: For Ninco and Carrera, a custom, simple and cheap conversion electronic board (NC Driver Board) has been designed: it's a small board which replaces or even works side by side with the existing lane changer driver: to convert existing LCs to work with oXigen (or SSD) cars, just replace the existing electronic or install it alongside the existing unit to run your existing system, switch to oXigen or SSD cars, and then back to your original digital system.The shape of the board has been designed as an easy retrofit inside the existing LC. No external boxes, wiring, *velcroing* ...

Q: what sort of skill is needed to update existing lane changers to O2?

A: soldering, common sense, and a screwdriver.

Q: do these board enable 'selective lane changing'?

A: Yes.

Q: what is the 'Selective Lane Change'?

A: *This feature is unique to Slot.it's oXigen.*
When driving a digital car, fast approaching a lane changer, the decision which must be taken is either to stay on the lane or change... but to which one? Is the next LC going from, say, lane 2 to 3, or from lane 2 to 1? From lane 4 to 3 or from lane 4 to 5? Anyone racing with digital slot car systems knows that it takes a long time to master the circuit well enough to know where each lane changer leads to, lane by lane. Well, the O2 native LC board, together with the SCP-1, offer this unique feature: want to change from lane 4 to 5? Press the UP button. Want to move to a inner lane? Then press the DOWN button on the SCP-1. Whant to change, no matter the direction? Press both UP and DOWN at the same time.
It works like this: each Lane Changer can be 'instructed' by DIP switches whether crossing from right to left moves you to the inside or the outside of the circuit, and viceversa. So that when you reach the LC with the DOWN button pressed, if you are on the, say, left lane, and the LC knows that a LC from left to right brings you to the inner lanes, it will change lane for you, else, if it knows that the same left to right change moves to an outer lane, it will not.
Actually when we designed the SCP-1 we put in two LC buttons imagining that some day some big company would build a digital system with this feature built in, and we could make it compatible – we could not imagine we would have used one day it for our own digital system.

Q: are there O2 specific lane changers (track pieces)?

A: Slot.it *is* developing oXigen lane changers for Scalextric Sport, and Ninco tracks. For now the NCDB (Ninco/Carrera driver board) is probably the most cost-effective way to get started.

Q: what sort of skill is needed to assemble these lane changers (track pieces)?

A: None, these parts are compatible with standard track pieces.

Q: what tools are needed to install the LCs (track pieces)?

A: Your two hands. The only exception is for Ninco track, if/when a LC must be installed across track pieces. Currently this requires modifications to the track, but we're working on a solution.

Q: do the lane changers send radio signals to the car?

A: no, it is not necessary, because it would currently just make things more complicated. The O2 architecture is based around a server (the PC through the USB 2.4GHz dongle interface) with a lot of distributed intelligence in the nodes (controllers, cars, LCs). If a specific action must be taken on a specific car (e.g. drive through, speed reduction...), the nodes know what to do.

Q: is automatic (race direction enforced) drive-through possible with simple LCs (box stock SSD for example)?

A: Not with box stock SSD LCs because they don't support selective LC. YES as long as selective lane changing is enabled.

Q: can I use the car without a PC?

A: Certainly. The PC is there to count laps, start/stop races, etc. The O2 cars can be used on a standard analog track as well.

Hardware components: in-car chip module (ICM)

Q: do they fit all brands?

A: Certainly; type '1' is Slot.it specific, type '2' fits really most cars. Besides, it can use the PCB mounted LED or an external, on wires, LED.

Q: can the car detect SSD rail code?

A: No. And no Ninco, SCX or Carrera either.

Q:what are the operating limits the in-car chip can withstand?

A: Current: 3A continuous, 6A peak at least. Voltage: 9 to 18V.

Q: does it have a lighting system, and if so, how is it operated

A: yes, it is compatible with Slot.it's lighting system SP16. Lights can be remotely operated from the SCP-1 buttons

Hardware components: Controller (SCP)

Q: is it a specific controller?

A: No, it is an SCP-1 or SCP-2 with dedicated cartridge. The cartridge receives the operating data from the top part of the SCP and sends it to the car.

Q: can I use my old SCP-1?

A: Yes.

Q: can I use my SCP-1 telemetry box?

A: Yes, it is compatible with O2.

Q: can I use any other controllers?

A: Not for now, but it will happen.

Q: do I get curves, selectable braking, antispin, telemetry...?

A: Everything the SCP-1 can do, is transferred to O2. Selectable curve(s)/linear mode, power reduction, adjustable braking, ghost mode, selective lane change, telemetry and lap timing audio playback compatible...

Q:can it be battery operated (untethered)?

A: Yes, absolutely. It can be battery powered either from the traditional power wires or from the top USB port.

The latest Li-Ion AA 14500 cells pack enough power to last for 8/10 hours at least (assuming a 50% discharge of the battery). So, in other words, two very cheap, *rechargeable*, AA sized cell provide all the power needed for endurance racing. Slot.it sells a suitable box with banana plugs and USB cable, but any series 2xAA holder will do if you want to DIY.

Bigger packages (e.g. 18500, or 18650) will certainly exceed 24 hours.

By the way, we have dropped any ideas of making a 6xAAA NiMh cells holder: battery technology has evolved so quickly that such box would have been obsolete before even thinking about it.

Hardware components: SCP-1 cartridge radio interface (optional, CRI)

Q: what does it do?

A: It enables radio, wireless communication between the hand controller (SCP-1 only) and *any* system in the world – analog or digital, as long as there is a standard SCP cartridge for it. If you have a SCP-1 or SCP-2, no matter for which system, you can turn your controller into a wireless controller.

Q: what is it?

A: A small module, a pocket size receiver accepting *any* SCP-1 cartridge, regardless of polarity and type. It comes with a small plastic case which secures itself on the cartridge (think of it as the middle half of the SCP-1 controller). It connects by 2.4GHz radio link to the oXigen cartridge which is plugged into the controller, and transmits in real time the power, brake and any other commands (lane change, lights, etc.) coming from the controller to the cartridge, thus creating a wireless, remote control SCP system for all the SCP-1 supported systems: analog (common ground or common positive), and digital (Hornby, Carrera, Ninco, SCX).

Q: do I need it to run a full oXigen system to have this?

A: Not at all. This is independent of the O2 system but takes advantage of the O2 cartridge and technology.

Q: So to make my existing analog or digital system wireless what do I need exactly?

A: SCP-1 throttle, oXigen standard cartridge, oXigen radio interface for the cartridge, SCP cartridge. In other words: a complete working SCP-1, an oXigen cartridge and an interface.

Pricing in EU – retail, VAT included

Item	*Suggested Price (retail)*	*Avg price (real store)*
Dongle	89	79
In-car chip	36	32
SCP-1 oXigen cartridge	75	69
Lane Changer Converters (NC)	29	26

The complete SCP-1 for oXigen retails for about 130 EU.

Q: Does this *include shipment and taxes?*

A: Yes of course. There are no hidden extra charges – these are retail prices but your preferred shop may apply a discount.

Q: So how much does a complete system cost?

Case A: Convert an existing SSD track to oXigen for three cars, three cartridges for *existing* SCP-1, one dongle, no lane changers (SSD LCs are already present in your layout), and no finish line:

Item	*Price (retail), no discount*
Dongle	89
In-car chip * 3	118
SCP-1 oXigen cartridge * 3	225
Total	*432*

In case three complete SCP-1s are needed, price rises accordingly.

Case B: Considering an existing digital track from Ninco or Carrera, and the conversion LC boards:

Item	*Price (retail), no discount*
Dongle	89
In-car chip * 3	118
SCP-1 oXigen cartridge * 3	225
LC conversion boards * 3	87
Total	*519*

Of course a lot depends on how many LCS you want to have in your system
Remember: these are *RETAIL PRICES* which *INCLUDE VAT AND SHIPMENT.*