

P090 - Policar lane changer

Double lane change straight for oXigen system



The P090 is the double lane change straight designed for the oXigen system, to be inserted into the Policar track by Slot.it. At its core, it can be described as a device for changing lanes, enabling drivers to find the fastest line or overtake a slower car. However, it offers much more. The P090 has features that allow you to customize its operation and tailor it to your specific needs. This will be explained in detail in the following sections.

Let's start by placing the lane changer (in short, LC) on the track and see how to configure it.

Unpacking and mechanical assembly

The P090 consists of (*Figure 2*):

- 2 pieces of straights with track crossings of standard Policar length
- 1 so-called 'gate mechanism'
- 2 intersection locking clips

One of the two straights contains the electronics for detecting the passage of cars and controlling the drive mechanics of the flippers dedicated to lane changes. The 'gate mechanism' facilitates the passage of the pickup of the car from one straight to the other.

The P090 requires some simple assembly steps:

1. Join the two halves of the LC (*Figure 3*).
2. Place them upside down and screw the 'gate mechanism' on (*Figure 4*).
3. Insert the intersection locking clips laterally at the junction point of the two straights (*Figure 5*).

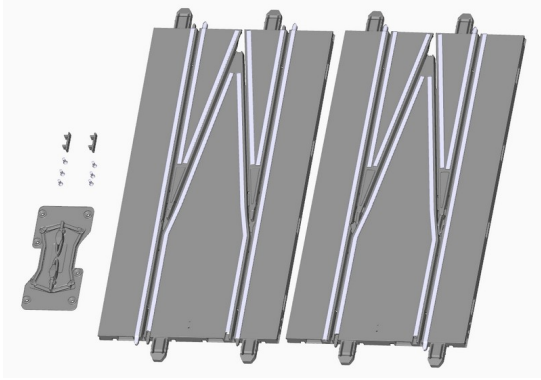


Figure 2

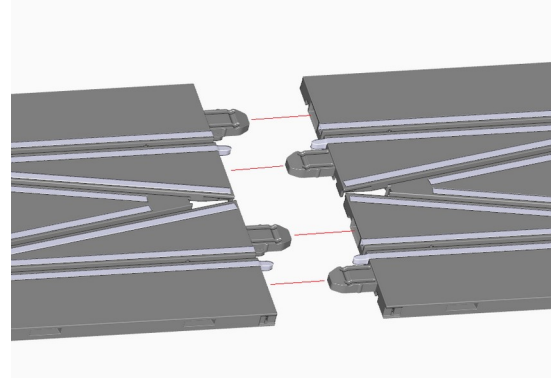


Figure 3

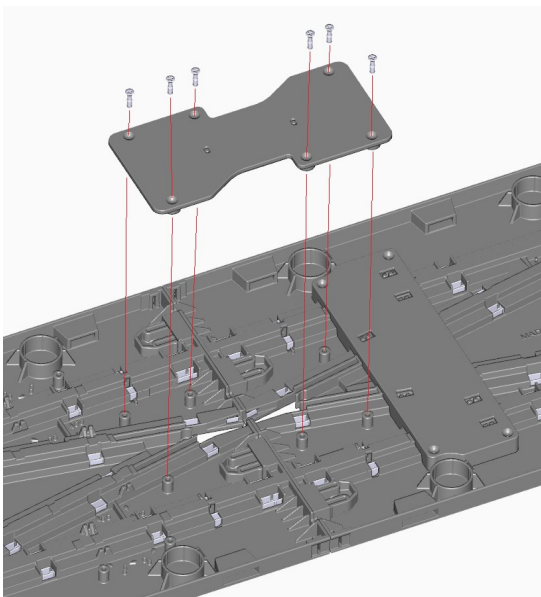


Figure 4

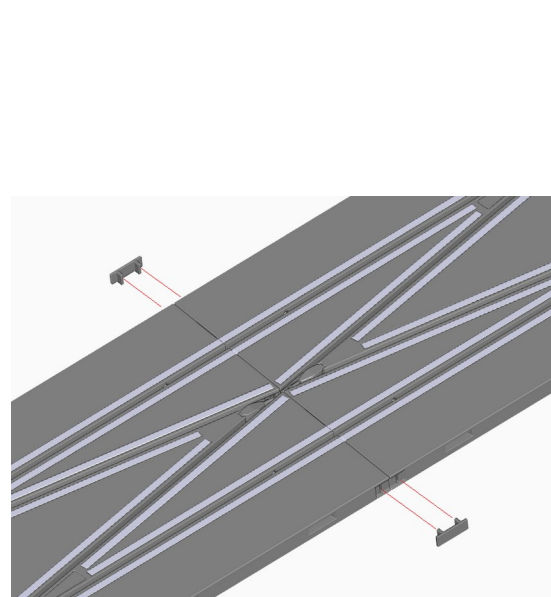
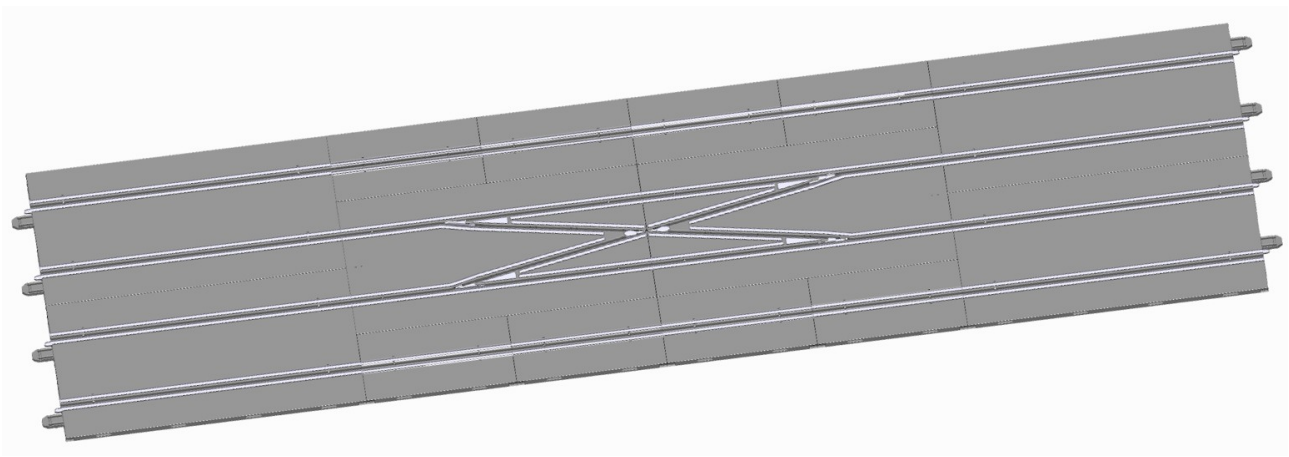
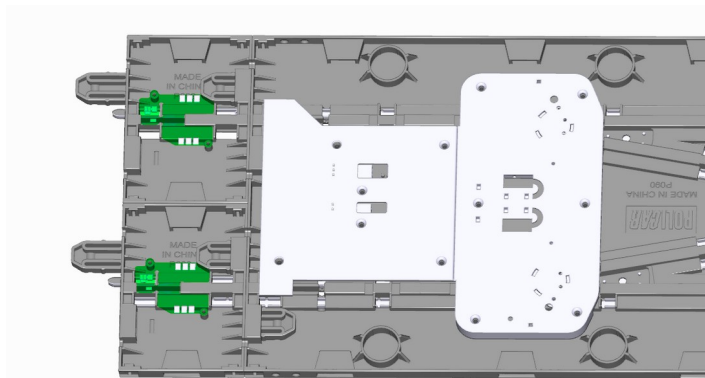


Figure 5

4. The flippers are on one side only of the LC and must match the correct direction of travel of the slot car.
5. The LC is designed to be used on a Policar track. However, with proper use of track adapter, it can be used on other maker's track systems as well. If used in a Ninco track we recommend using two P006 Policar adapters and two P024 short straights to match a Ninco length of 120cm.
6. The LC may also be used across lanes (e.g. between lane 2 and 3) using the single lane part P091.



7. For very high speed crossing it may be necessary to use the ad-hoc single lane sensor assembled on a separate single lane short straight P092.



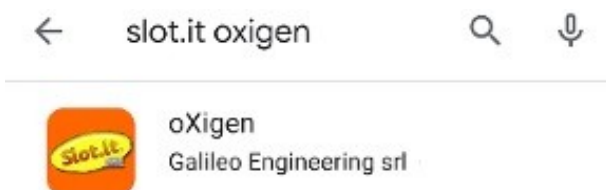
8. Exposure to direct or diffuse sunlight can affect the proper operation of the LC by preventing it from recognizing the lane change commands sent by cars.
9. The Policar XXLC is also compatible with Scalextric's own SSD (Scalextric Sport Digital) digital system. Some features (e.g. selective lane change) may not be supported by SSD protocol.

Activation

If you are familiar with oXigen devices, you know that before any other action, the P090 must be ACTIVATED with the Slot.it APP. Without activation, the P090 will not work. What is activation? Very simply, via Bluetooth, the APP reads the network ID (known as MAC) of the LC, permanently writes the current date in the P090 memory, and saves the following data: your email, the MAC of the LC, the activation date, the firmware version, and the device name in a cloud database that we can access. The same data is available on the APP.

The activation date is the date used for warranty purposes. Regardless of when you bought the LC and the availability of the purchase receipt, we consider a two-year period from the day you actually start using your device – which is the activation date. You must give a name to the LC, which is quite useful if you have more than one.

As we develop the APP further, it will become an indispensable companion to the P090, extending its capabilities, with more advanced features becoming available. The APP is also used to update the LC's firmware to the latest version and to configure its operational modes. Note: the APP display has been condensed to fit inside these paper sheets.



1. Search for oXigen in the APP store. Don't search for Slot.it unless you want get a darn slot machine game. Download and install the Slot.it APP on your

Android (Android 7.0 or greater) or iOS device. Geographic location must be turned on (required by Android BLE function, we don't use such data).



2. Register yourself (email necessary) to access the APP. Enter your email, and touch 'Request Access Code'. The APP sends a confirmation email is sent to your address: copy the code from your inbox, and enter it into the app in the 'Access Code' field. Now press the 'User Login' button that has just appeared
3. The electronic circuit inside the P090 is powered directly from the track lines.

For use in oXigen mode, the track must be powered by 10,5-16V-DC. The positive pole of the power supply must be connected to the right rail (relative to the direction of travel) of each lane, and the negative pole to the left rail of each lane. Both lanes must be powered.

If the track is already powered, turn it off and then on again to reset the system. On the piece of straight containing the electronic circuit, you will notice two holes positioned in the middle width at the initial part. Through one of these holes, you will see the feedback LED. When the track is powered, this LED will flash red for a few seconds and then remain solid red. This indicates that the LC is ready to be contacted and activated via the app.



4. So launch the APP (you've done that already if you've followed steps 1. and 2.), login if necessary, then tap 'Add'
5. The APP searches for the P090 for a while (you will notice a circle in the middle of the screen), then, when the P090 is detected, it appears on screen as *LnChg-inactive*. Enter the name you want to assign to the LC in the 'Device Name' field and tap 'Register'. A confirmation message will follow.
6. The APP searches for the P090 for a while (you will notice a circle in the middle of the screen), then, when the P090 is detected, it appears on screen as *LnChg-inactive*. Enter the name you want to assign to the LC in the 'Device Name' field and tap 'Register'. A confirmation message will follow.

7. By tapping on 'Devices,' the registered LC will appear in the 'Your Registered Devices' list with the name you assigned. The word "(online)" that may appear next to the name indicates that the device is available for connection via Bluetooth Low Energy (BLE).
8. **Warning:** by selecting the LC and tapping 'Remove', the device ownership is deleted from the database. What does it mean? That the LC will no longer appear in the 'Your Registered Devices' list. To make it reappear, you need to add it again as if it were a 'new' device.
9. Turn off and on again the track. The LED on the P090 will light up solid green, indicating that it is powered on and ready for use.

Operation mode

Once registered, the P090 is ready to be used in its default configuration. The LED on the LC is steadily lit green.

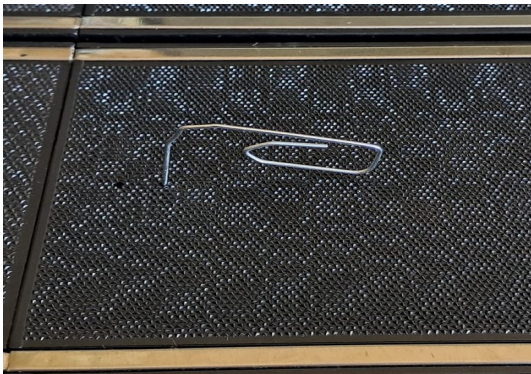
<u>Left flipper control on SCP</u>	DOWN or UP+DOWN arrow keys
<u>Right flipper control on SCP</u>	UP or UP+DOWN arrow keys
<u>Flipper open mode</u>	Dynamic
<u>Flipper open time</u>	300ms
<u>Anticollision</u>	Enabled
<u>Lane change re-enable time</u>	75ms

When the car passes over the left flipper, relative to the direction of travel, and the lane change command is sent by the SCP, the LC is actuated, and the LED on the interchange lights up red for the duration of the LC actuation before returning to green.

Similarly, when the car passes over the right flipper, always relative to the direction of travel, and the lane change command is sent by the SCP, the flipper will actuate, and the LED on the interchange will light up orange (red+green) during the flipper actuation before returning to green.

Checking it out

The mechanical operation of the flippers can be controlled without the help of the car and the SCP controller.



Turn on the LC. Insert a tip (such as a paper clip) into the hole next to the LED; inside, you will find a small button. Quickly press and release the button on the LC once with a tip: the left flippers will operate for 500ms, and the LED will light up in red for the same duration.

Quickly press and release the button twice on the LC with a tip: the right flipper will operate for 500ms, and the LED will light up in yellow for the same duration. This operation is independent of the flipper operation configuration assigned via the app.

Configuration

As mentioned, the P090 comes with a default configuration. Therefore, once installed on the track, it is ready to be used. However, it is possible to customize the operation mode of the LC through the app.

To start, ensure the track is turned on; the LED on the P090 should be solid green. To enter the configuration mode, insert a tip into the hole next to the LED. Press and hold this button for a few seconds until the LED flashes red and then turns solid red. This indicates that the P090 is available for Bluetooth Low Energy (BLE) connection.

Next, start the app and select the LC with the name you assigned. Tap on 'Info.' This will open the page dedicated to that device. Tap on 'Connect' to access the LC page. Here, various parameters are displayed, including the name and version of the firmware currently loaded on the device. If desired, you can change the device name. The configuration parameters are also shown below, each accompanied by a ' ? ' button. Tapping on it will display a brief help message related to that configuration.

Configuration parameters are detailed below. 'Left' and 'Right' refer to the car's direction of travel.

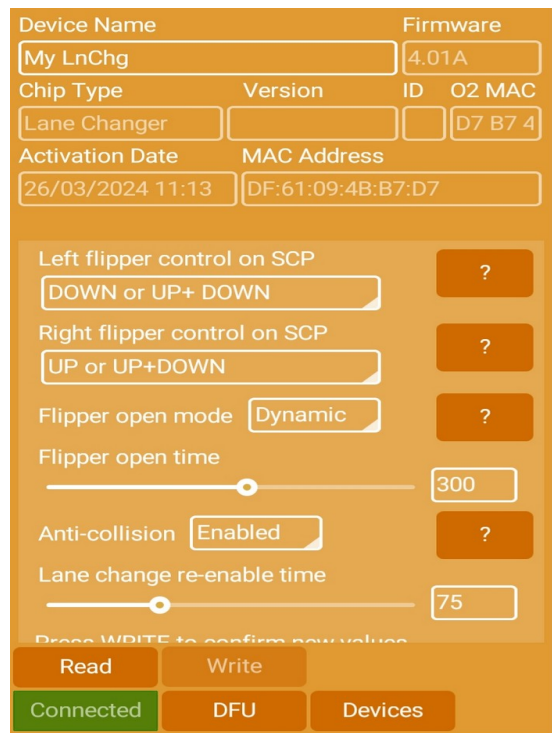
The settings in **bold** represent the defaults.

** Left flipper control on SCP

Disabled	The flipper will not be activated under any circumstances.
UP or UP+DOWN	The flipper is activate when either the up arrow key is pressed or both arrow keys are pressed simultaneously.
UP+DOWN only	The flipper is activated when both arrow keys are pressed simultaneously.
DOWN or UP+DOWN	The flipper is activate when either the down arrow key is pressed or both arrow keys are pressed simultaneously.
Any buttons	The flipper is activated by pressing any single arrow key or both arrows keys.
Change always	The flipper is automatically activated when the car passes over it, irrespective of the arrow button states.

** Right flipper control on SCP

Disabled	The flipper will not be activated under any circumstances.
UP or UP+DOWN	The flipper is activate when either the up arrow key is pressed or both arrow keys are pressed simultaneously.
UP+DOWN only	The flipper is activated when both arrow keys are pressed simultaneously.
DOWN or UP+DOWN	The flipper is activate when either the down arrow key is pressed or both arrow keys are pressed simultaneously.
Any buttons	The flipper is activated by pressing any single arrow key or both arrows keys.
Change always	The flipper is automatically activated when the car passes over it, irrespective of the arrow button states.



**** Flipper open mode**

Fixed	The flipper remains open for the time specified in the 'Flipper open time' field.
<u>Dynamic</u>	The slower the car, the longer the flipper stays open. The minimum time is 60 ms, while the maximum is defined by the value set in the 'Flipper open time' field.

**** Flipper open time**

The flipper remains active, allowing lane changing, for a maximum duration defined by this field. The allowable range is 60-500 milliseconds. The default value is **300** milliseconds.

**** Anticollision**

Disabled	Flippers are activated according to the value assigned to the Left/Right flipper control on SCP
<u>Enabled</u>	The LC automatically intervenes on the flippers action to prevent a possible collision between cars.

**** Lane change re-enable time**

After the car passes, the LC is temporarily deactivated for the duration set by this parameter. A shorter duration is suitable for expert racers willing to risk potential collisions. For more assertive anti-collision measures, opt for a longer duration. The allowable range is 0-250 milliseconds. The default value is **75** milliseconds.

If one or more parameters are changed, the background color of the 'Write' button turns red. Tap on it to save the data to the device.

The P090 firmware can be updated by tapping the DFU (Device Firmware Update) button. A list of available firmware versions will be displayed, and you just need to choose the desired version and confirm the operation.

DFU emergency mode

The use of the Slot.it application, as described in the previous section, is recommended for updating the P090 firmware. LC do not allow firmware updates other than those intended for them. However, there may be situations where updating the firmware directly becomes necessary. This can be done through the Slot.it application or Nordic Semiconductor's nRF DFU application.

To initiate the P090 in DFU mode, turn off and on the circuit by holding down the switch button with a tip. The LED will flash in red and yellow colors for a few moments and then remain steady yellow.

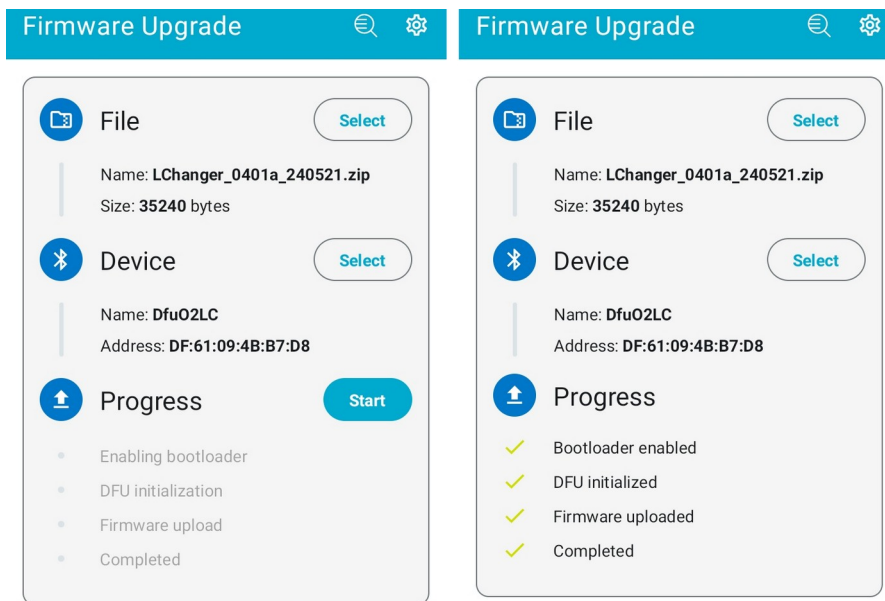
Next, start the Slot.it app and connect to the LC from the list of devices. Then, select DFU. The app will guide you to a list of available firmware versions. Choose the desired version and commence the DFU update process.

For Apple iOS users, DFU updates can only be performed through the Nordic app.

Download the firmware version that you want to put on your P090 from our website (<http://www.slot.it> – oXigen Download Firmware area) on your mobile device. Note where it is being saved. Remember that the firmware has a name and the name follows this convention: Lchanger-rel-date.zip

Start the nRF DFU app and select the file for updating. Choose the *DfuO2LC* device and tap the 'Start' button adjacent to 'Progress'. The upgrade operation will be completed.

If the update fails, check that you have selected the correct file suitable for the LC.



Tech specs

Suitable for: Policar track by Slot.it (or other brand track with suitable track adapter)

Size: overall length is 716mm (equivalent to 2 pieces of P008)

Compatible with: oXigen in-car chip programmed with firmware releases 3.xx or 4.xx, SSD

Power supply: 10,5 – 16V DC. (+) on the right rail, (-) on the left rail, relative to the direction of travel, on both lanes.