

CHAOS



Symbol for **CHAOS**, means disorder

Cockpit-XP (abbreviated CPX) uses this term to indicate that the race has been stopped. Something has happened that forces every other car to stop immediately.

On analog tracks, this is done by interrupting the power to all tracks.

On digital tracks (Carrera), this also happens, but NOT by interrupting the power. Instead, all cars are immediately stopped by the CU. The cars' lights remain on, which is quite useful because you can immediately see that the other cars are still in contact with the tracks! For example, a car can also stop exactly at a dead point on a switch, or it can no longer make contact with the tracks at that point.

How is Chaos caused (activated) on the digital racetrack?

- 1) By pressing the start button on the CU
- 2) Via the PC keyboard (Space bar)**
- 3) Using a remote control (which then controls the keyboard)**
- 4) Using an external pushbutton (multiple) connected to inputs (which the CPX can read)**
- 5) Using the CU adapter (2 or 3 clicks with the controller)
- 6) Using the Switch ID Reader (2 clicks with the controller)
- 7) Automatically using sensors on the racetrack**

How is Chaos immediately deactivated (disabled) digitally on the racetrack?

- 1) By pressing the ESC key on the CU*
- 2) Using the PC keyboard (Space bar)**
- 3) Using a remote control (which then controls the keyboard)**
- 4) -
- 5) -
- 6) Using the Switch ID Reader (2 clicks with the controller)
- 7) Using the PC keyboard (Space bar)**

* This could also be done with the start key, but then you'll have to repeat the start procedure!

** CPX runs on the PC and controls these functions.

How is Chaos activated (activated) on the analog racetrack?

- 1) By manually turning off all tracks with a switch
- 2) Via the PC keyboard (Space bar)**
- 3) Using a remote control (which then controls the keyboard)**
- 4) Using an external pushbutton (multiple) connected to inputs (which CPX can read)**
- 5) Automatically using sensors in the racetrack**

How is Chaos immediately deactivated (disabled) on the analog racetrack?

- 1) By manually turning on all tracks with a switch.
- 2) Via the PC keyboard (Space bar)**
- 3) Using a remote control (then controls the keyboard)
- 4) -
- 5) Via the PC keyboard (Space bar)**

** CPX runs on the PC and controls these functions.

What is the best/nicest solution for digital?

Yes, it depends somewhat on what type of controller you use: wired or wireless?
 Do you have a fixed sitting/standing position at the race track?
 Do you also want to know who caused Chaos?
 If you have a fixed position and a fixed handheld controller, and the push button is close by, then solution 4 is best.

If you use a wireless controller, you don't want a fixed push button to activate Chaos. Is a CU adapter (5) or a remote control (3) a better choice?
 However, with these options, you don't know who caused Chaos (yes, only the person who operated it).

Using the CU or directly on the PC is often not convenient if you're racing with 6 people?

You have to implement the above solutions yourself!

Automatic or with the Switch ID Reader:

This is the easiest way to do it; no more arguing about who caused the chaos and, if necessary, immediate punishment.

Chaos	Chaos Who caused the chaos?	Cancellation	Via CU	Via Cockpit-XP
Wired controller	No	Yes#	Yes*	Yes#
Wireless controller	No	Yes#	Yes*	Yes#
Pushbutton	Yes	No	NO	Yes
CU	No	Yes	-	Yes
CU- Adapter	No	No	Yes	No
Cockpit-XP	Yes	Yes	Yes	-
Remote control	No	Yes	No	Yes
Automatic	Yes	No	No	Yes
Switch ID Reader	Yes	Yes	Yes	Yes

#via Switch ID Reader

*via CU Adapter and Switch ID Reader

Fast Chaos:

That means you want to stop the race as quickly as possible if your own car flies off the track!

Assuming a car (1:32) travels an average of 3 meters per second, that means every 100 mS = 30 cm.

Reaction times:

- 1) The driver sees their car crash.
- 2) The driver must press a button (activate Chaos).
- 3) The pressed button immediately activates the CU (hardware).
- 4) The pressed button is read out by the PC, which then activates the CU (hardware-intensive).
- 5) The pressed button is read out by the PC, which then activates the CU (software-intensive).

Influences on reaction times:

- 1) Can the driver always see the car clearly?
- 2) How far is the driver standing or sitting from the button? 3) CU adjustment necessary, but very fast
- 4) CU adjustment necessary, but less fast than in point 3
- 5) No CU adjustment necessary, and probably almost as fast as in point 4

Which components have the greatest influence on the total reaction time?

(mS => Millisecond)

- 1) 500...2000 mS
- 2) 500...3000 mS
- 3) 10 mS
- 4) 50...500 mS
- 5) 50...500 mS

Looking at the reaction times, the driver is actually responsible for fast Chaos, so should the push button be within easy reach?

The remote control, CU Adapter, and Switch ID Reader could be the best solution for "Fast Chaos" activation!

Automatic:

Chaos is automatically activated as soon as a car (ID) fails to report in on time.

This is done using IR sensors in the racetrack. The best placement for these sensors is in a straight section of track after every curve. However, these sensors can also be useful in a long straight section of track; in practice, this means that an IR sensor is present every 2...4 meters in every lane.

Measurement:

Previously, this measurement was performed using an AddOn in CPX; Chaos was activated as soon as the maximum time between IR sensors had elapsed. In itself, this worked reasonably well, but unfortunately not sufficiently, because other AddOns experienced delays as a result. Consequently, over time, execution lagged behind reality, resulting in increasingly delayed Chaos activation, especially when 6 cars were racing simultaneously. In this situation, it could take 5...10 seconds before Chaos was activated!

Possible solutions:

- 1) A faster computer running CPX
- 2) Solving the measurement not via an AddOn, but independently of the PC

Since it is questionable whether solution 1 would be sufficient, I have chosen solution 2.

A new module has been developed that shares the same basis as the expansion for I/O expansions in CPX (Arduino 47/15).

This module operates independently of a computer system and can therefore be used in any digital layout that works with IR sensors compatible with the Carrera system.

If you already have IR sensors in your race track used for CPX, it is possible to use these sensors for this application as well and/or for the ID Reader! So, one IR sensor is connected to multiple modules, only one of which supplies the power for these IR sensors! Because this module **operates independently of a computer system**, it has the following advantages:

- * also suitable for systems other than CPX
- * faster
- * can also be used in conjunction with the Switch ID reader
- * configuration options for VSC and SC
- * Auto start after chaos

Currently, the module for Carrera Digital is ready and in the testing phase; the analog version is in preparation, which will allow 8 lanes to be monitored.