XTRA.SECTOR / TIMING USE CASES

User Manual

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Safety

All products are designed as supplement to make go-karting safer, but cannot replace safe track procedures. If equipment fails, the normal operating procedure must still be adequate to safely operate the track.

This guide has been written with great care. However, the manufacturer cannot be held responsible, either for any errors occurring in this publication or for their consequences.

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Document history

Owner	Date	Version	Remarks
K.T	2022-9-6	1.4	Changed layout and style
GJ de Ruiter	2021-10-22	1.3	Added sector function that maintains current speed limit
GJ de Ruiter	2021-03-04	1.2	Added sector functions for changing group numbers
GJ de Ruiter	2020-12-15	1.1	Added Mk2 sensor
GJ de Ruiter	2020-09-23	1.0	Release
GJ de Ruiter	2020-08-21	0.1	Preliminary draft – Initial document

Reference documents

Reference	Title, author
Ref-1	

Terminology

Abbreviation	Description
XBB	Xtra.Black Box
XRC	Xtra.Remote Control
XTP	Xtra.Shutdown Transponder
XS	Xtra.Sensor
XB	Xtra.Beacon

1 Introduction

This document provides system integrators insight in the De Haardt Sector Control system and aid for setting up tracks correctly. Several popular use cases are presented that will ease installations.

Figure 1.1
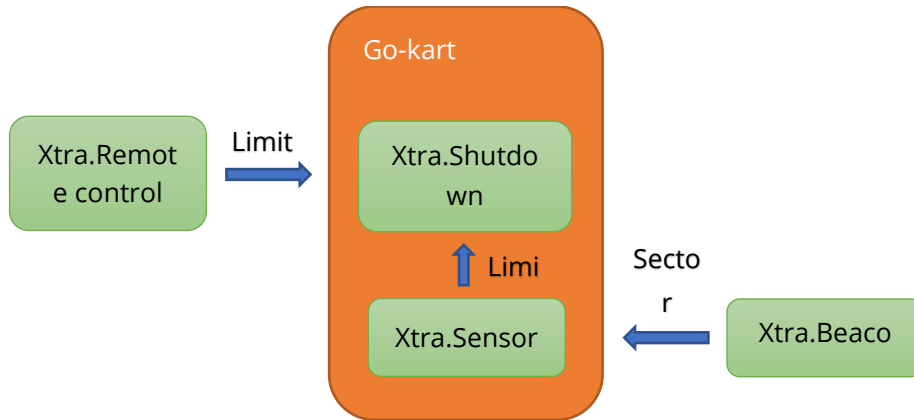
1.1 Shutdown transponder limits

The Xtra.Shutdown transponder continuously monitors and lists all active speed limits and executes the lowest from this list. When a specific limit is removed then the previous overall limit is thus restored. An exception is the remote-control limit, as this **removes** the sector limit from the list.

Speed limit	Received from	Description
Go-kart start-up limit	Xtra.Shutdown Transponder	Initial speed limit Configurable with Xtra.Remote control
Remote control limit	Xtra.Remote control	Speed limit from Xtra.Remote control
Sector limit	Xtra.Sensor	Sector limit is set-up on Xtra.Beacon
Go-kart limit	Xtra.Shutdown Transponder	Maximum speed the go-kart is allowed to drive Configurable with Xtra.Remote control
Penalty limit	Xtra.Sensor or Xtra Remote control	Penalty limit is active for a number of seconds
Brake limit	Xtra.Shutdown transponder	Limit is active while brake switch is engaged

1.2 Firmware versions

Red Mk1 Xtra.Sensors purchased in 2016 or before may not be capable of boost or emulation of Xtra.Remote control limits. The same goes for 8-speed sector limits. If this functionality is required then please verify that Xtra. Sensors are running "SCT-SNS v2.03 y19m09d26" firmware. Black Mk2 sensors are compatible with the red Mk1 sensors running "SCT-SNS v2.03 y19m09d26" firmware. For Black Mk2 sensors it is recommended to update to version 1.2.2.

Sensor	Firmware	Boost function	8 speed	Remote-control emulation	Maintain limit
Xtra.Sensor Mk1 (Red)	< v2.03				

Xtra.Sensor Mk1 (Red)	SCT-SNS v2.03 y19m09d26	Yes	Yes	Yes	
Xtra.Sensor Mk2 (Black)	sct-sns-v0.4.0-r15286	Yes	Yes	Yes	
Xtra.Sensor Mk2 (Black)	sct-sns-v1.2.2-r19395	Yes	Yes	Yes	Yes

1.3   Sector numbers

Sector numbers are configured on the Xtra.Beacon with a magnetic-tip pen. It is advised to use unique sector numbers for every loop. This makes it possible to control sector limits in individual sectors and sector loops can be configured for lap / sector timing.

1.4 Lap-timing

The sector number determines whether or not a lap-timing event is generated. Behaviour is configurable in the Xtra.Sensor. Sensors are pre-configured at the factory to generate lap-timing events at sector numbers 1, 2, 3 only. The use-cases in this document assume the factory-default configuration. It is advised to keep the number of lap-timing loops low to prevent loss of lap-times.

1.5 Start-up limit

At start-up the EV and CAN shutdown transponders limit to a predefined value. Fuel shutdown transponders are not limited at start-up. The start-up limit is configurable with the Xtra.Remote control. This limit is removed on passing a sector loop or on reception of an Xtra.Remote control speed limit. Since firmware version 1.2.2 of the Mk2 sensor it is possible to maintain the startup limit instead of removing it. Sector loop function 9 does that. Function 9 is the recommended setting for timing loops.

2 Use cases

This chapter shows frequently used track configurations and provides setup recommendations. Beacon loops are marked with a red line. The associated beacon number and function are given in short notation "Sn:" and "Fn:" respectively.

2.1 Pit-out only

The "Pit-out" loop limits go-karts to Speed-3 using beacon function Fn:51. This emulates the Xtra.Remote control Speed-3. If Fn:51 does not limit go-karts (old sensor), then Fn:13 may be used instead.


Figure 2.1
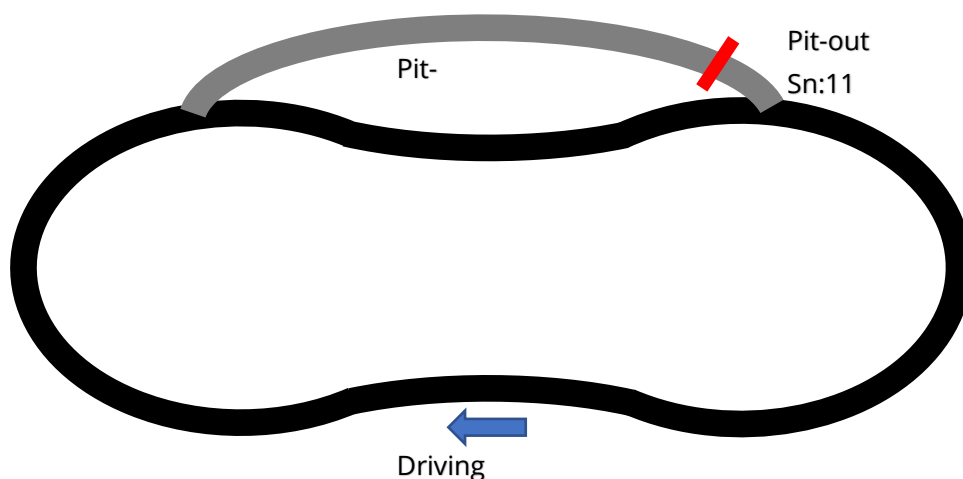
2.2 Lap-time only

Lap-times are generated at the Finish line. Fn:18 disables sector speed limit. Fn:18 works for both 4-speed and 8-speed configurations.

Caution! After start-up the go-karts must be assigned a speed limit with the Xtra.Remote control, because the go-kart start-up limit is removed at the Finish loop. Alternatively for new Mk2 sensors, sector loop function 9 can be selected. This function does not alter current speed limit.

Figure 2.2

Pit-

Finish

Sn:01 Fn:9

(Fn:18   for   older

Driving
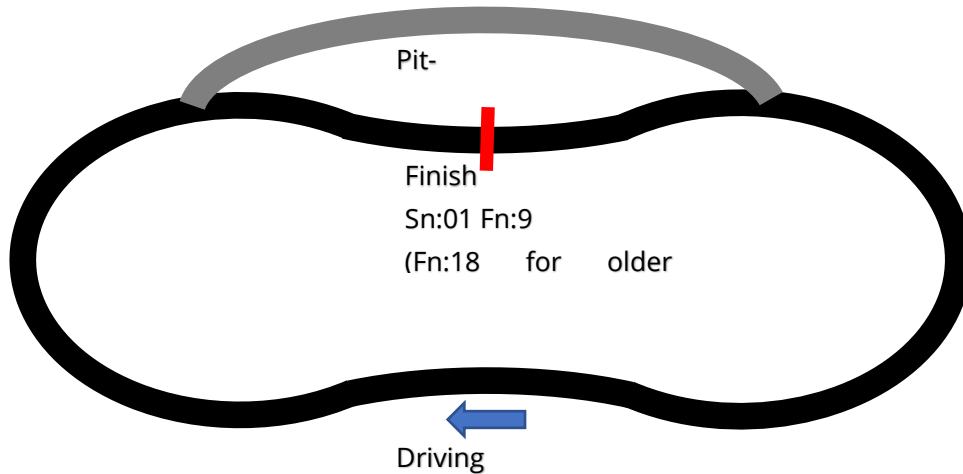
2.3 Lap-time with pit-out

The "Pit-out" loop limits go-karts to Speed-3 using beacon function Fn:51. This emulates Xtra.Remote control Speed-3 which persists at the finish loop. If Fn:51 does not limit go-karts (old sensor), then please update sensor firmware.

Caution! Do not use Fn:13 for older sensors because after passing the finish loop the go-kart is not limited anymore.

Figure 2.3

Pit-out

Sn:11

Pit-

Finish

Sn:01 Fn:9

(Fn:18   for   older

Driving
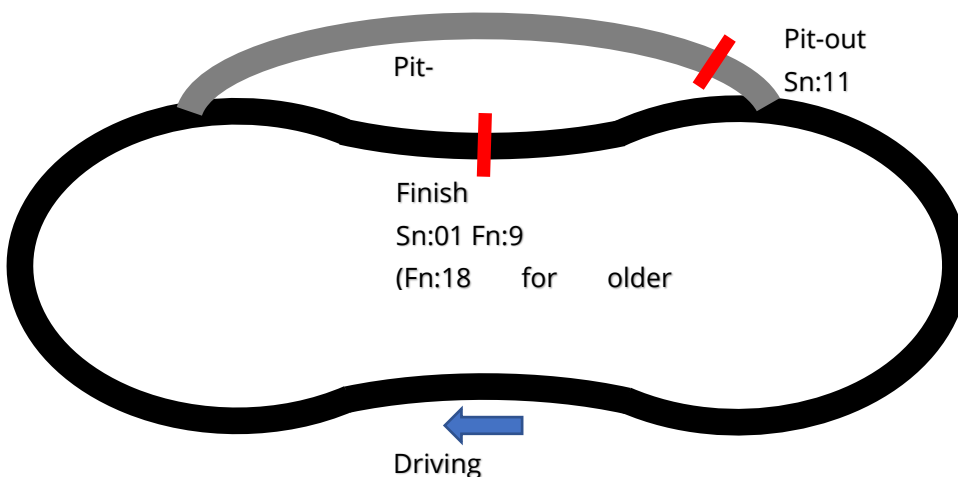
2.4   Lap-time with pit-out and dangerous sector

The "Slow sector" loop limits go-karts to Speed-2 and (optionally) generates an intermediate lap-time. The "Normal sector" loop removes the sector limit thus restoring the previous "active" limit. Note that the dangerous sector is assigned number 2 and marked yellow in this example.
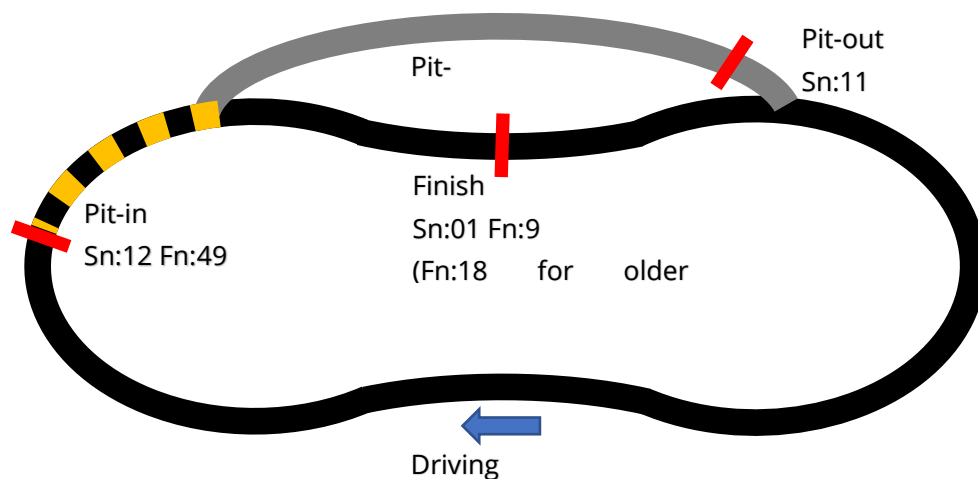
Figure 2.4

Pit-out
Sn:11

Pit-

Finish
Sn:01 Fn:9
(Fn:18   for   older

Normal sector

Slow sector

Driving
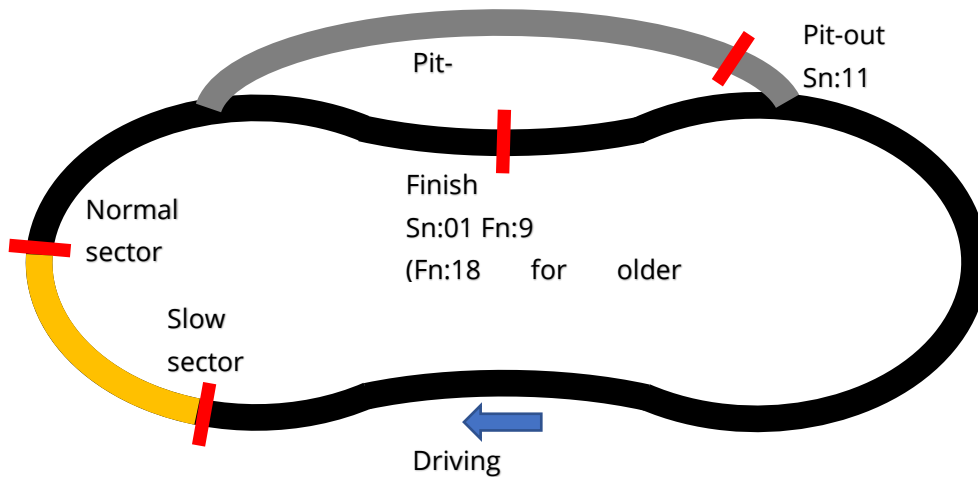
2.5   Lap-time with pit-out and pit-in

The "Pit-in" loop is turned on at end of heat by applying power to the Xtra.Beacon. Then all passing go-karts are limited to Speed 1. Preferably use Fn:49 as this overrules all 8-speed configurations. If Fn:49 does not limit go-karts (old sensor), then Fn:11 may be used instead. Note that the "Pit-in" loop is placed some distance before the pit-lane entrance. This is because speed limit needs time to engage.

Figure 2.5

Pit-out
Sn:11

Pit-

Finish
Sn:01 Fn:9
(Fn:18   for   older

Pit-in
Sn:12 Fn:49

Driving

3 Sector functions

Overview of sector functions. These are configured on the Xtra.Beacon with a magnetic-tip pen.

Sector function (Fn)	Description	Notes
9	Maintain start-up limit	Implemented in sct-sns-v1.2.2-r19395 Recommended for timing loops
10	Set sector limit to SPD0 (STOP)	
11	Set sector limit to SPD1	
12	Set sector limit to SPD2	
13	Set sector limit to SPD3	
14	Set sector limit to SPD4	
15	Set sector limit to SPD5	Implemented in SCT-SNS v2.03
16	Set sector limit to SPD6	Implemented in SCT-SNS v2.03
17	Set sector limit to SPD7	Implemented in SCT-SNS v2.03
18	Set sector limit to SPD8	Implemented in SCT-SNS v2.03
19	Reload boost time	Implemented in SCT-SNS v1.18
20	Change group to 1	After this loop go-karts listen to Group 1 commands only
21	Change group to 2	After this loop go-karts listen to Group 2 commands only
22	Change group to 3	After this loop go-karts listen to Group 3 commands only
23	Change group to 4	After this loop go-karts listen to Group 4 commands only
24	Change group to 5	After this loop go-karts listen to Group 5 commands only
25	Change track to A	After this loop go-karts listen to Track A commands only
26	Change track to B	After this loop go-karts listen to Track B commands only
27	Change track to C	After this loop go-karts listen to Track C commands only
28	Change track to D	After this loop go-karts listen to Track D commands only
48	Emulate remote control limit SPD0	Implemented in SCT-SNS v1.18
49	Emulate remote control limit SPD1	Implemented in SCT-SNS v1.18
50	Emulate remote control limit SPD2	Implemented in SCT-SNS v1.18
51	Emulate remote control limit SPD3	Implemented in SCT-SNS v1.18
52	Emulate remote control limit SPD4	Implemented in SCT-SNS v1.18
53	Emulate remote control limit SPD5	Implemented in SCT-SNS v1.18
54	Emulate remote control limit SPD6	Implemented in SCT-SNS v1.18
55	Emulate remote control limit SPD7	Implemented in SCT-SNS v1.18
56	Emulate remote control limit SPD8	Implemented in SCT-SNS v1.18

Sector number (Sn)	Description	Notes
0	Reserved	
1 – 30	Set sector number (Sn)	
31	Set sector number 31 & Reload boost time	Implemented in SCT-SNS v1.18