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“Trainer”

Passenger Car Driving Simulator FPT



User's Manual

Software F12 Version 6.8

Contents

1. Normal Operation of the Simulator FPT “Trainer”
2. Using the Menu of Passenger Car Simulators F12P
3. Eco-Driving
4. Road Safety
5. Motorsports
6. Fitness to Drive
7. Manoeuvring with a Trailer
8. Free Driving
9. Driving School
10. Account Card Operation
11. Software Update Procedure
12. Assembly Instructions for the Sight System F3/Lxx
13. Assembly of the Kinect Sensor

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Normal Operation of the Simulator FPT “Trainer”

Since the driving simulator FPT is used for training, its normal use is to switch it on in the morning and to switch it off in the evening. Although it does not malfunction if left on for several days, we do not recommend this for more than five or six days.

Switching the simulator on

When the simulator F12PT is powered up, it does not normally start automatically. Therefore we recommend the following start-up procedure:

1. Plug the main power connector into a wall outlet. For simulators with internal sight system this is the simulator’s power cord connector. For external sight systems, it is the external power distributor’s input connector.

External sight systems may draw a high switch on current when all monitors are turned on simultaneously. If your fuse opens when powering up the system, please read the section “Fuse problems” further down.

2. Switch on the monitors (only when using external plasma, LCD or projection screens). If they stayed active in 'stand-by' mode (showing a light on the front of the monitors), they can be activated using the remote control. For details, please refer to the monitors’ manual.
3. Switch on the simulator computer (not necessary if your simulator is equipped with an uninterruptible power supply). This is done by pressing the PC’s power button. This button can be reached on the front of the simulator. There is a hole in the front door that allows access to the push button of the PC inside.
4. The startup procedure will take about one minute and can be observed on the screens: A normal PC boot procedure leads to a Windows desktop. Then, the simulator program is started. After initializing itself, it takes over the screen. If nothing is shown (“No Signal”), you may have to switch the monitors’ input signals using the remote control. For details see the manufacturer’s manual.
5. Once the simulator screens are visible, the simulator is ready for use. If the simulator was set up in a new location, we recommend to perform a calibration, which is described in "Description of the Menu Control" – Section 2.2 Calibration.

Switching the simulator off

The simulator F12PT is a complex machine using a modern computer. If your simulator is not equipped with an uninterruptible power supply (UPS), you must not switch it off by just removing the power cable / using the external power switch. Doing so endangers the integrity of simulation data and state and may even cause permanent damage to the computer hardware. Please adhere to the following instructions.

1. Shut down the computer (not necessary if your simulator is equipped with a UPS) in either of two ways:
 - a. Press the power-button on the front of the computer. This button can be reached on the front of the simulator. There is a hole in the front door that allows access to the pushbutton of the PC inside.
 - b. Choose the Shutdown entry in the menu of the simulator program. Navigate to the service menu. Select the 'Shutdown simulator' entry using the Line button. Activate it using the Mode button to start the shutdown process.

The computer shutdown process will take about 30 seconds.

2. Now the monitors or projectors may be switched off (by either using the remote control 'OFF' button on all monitors, or by just switching them off with their power switches (if present). This step is highly recommended in order to avoid fuse problems when powering on.
3. At last the main power can be disconnected by unplugging the main power connector. For some projectors it may be necessary to wait some time in order to let the fans cool down the projectors. Details may be found in the projector's user manual.

Audio Volume

The active loudspeaker used for audio output is located on the left hand side of the simulator's footwell. Its volume knob may be used to control the overall volume of the simulator's sound system.

Initial Start Up

Before first use, any packaging material (polystyrene, foam, ...) used to secure the PC (located behind the front lid) during transport must be removed.

Moving the Simulator

The stands of the sight system are height adjustable by screwing their bases. The simulator is moved independently of the sight system. Cables should be removed before and reconnected after moving the system. Make sure, that no shearing force is applied to the sight system legs.

Language Buttons

Depending on your simulator's configuration, the language may be changed using two push buttons. Please finish the current exercise before switching the language. Otherwise, the language will not be changed completely.

Motion Supports

If your simulator is equipped with motion supports, their power supply lines are automatically switched on and off together with the simulator. In order to become active during simulator operation, each motion support must additionally be switched on with its own power switch, the small signal selector lever adjacent to the signal connector must point downwards and the red emergency switch must be pulled.

Using the Menu of Passenger Car Simulators F12P

The driving simulator software F12P allows many settings and adjustments and the choice between a multitude of driving tasks/settings. The necessary choices can be made using either a set of navigational keys together with an “OK” button or the three buttons “Line”, “Mode” and “Enter”. Depending on the simulator, these buttons may be located in different places, see “Control Element Variants” at the end of this document for details.

All adjustments are made via a menu. This menu can be called up, when the simulator is in rest mode, that means if no drive is currently running. It is usually displayed automatically, and can be opened by pushing either “Line” or “Mode” if currently invisible.



The menu is structured line by line and shows a cursor in the form of a red bar. In general, the button “Line” moves the cursor, while the button “Mode” activates or modifies a menu text. Using navigational keys, the cursor can be moved up and down. Navigating to the right activates or changes a menu item while navigating to the left changes the menu text in the opposite order. When a drive is started using the “Enter” or “OK” button, the current settings in the menu determine the simulator’s behaviour. Depending on the set of buttons present on the simulator, a drive is aborted by pressing “Mode” and “Line” simultaneously or by pressing the buttons labelled “A” and “B” simultaneously or by pressing the “Home” button labelled with a house symbol.

The first menu line, shown in yellow, describes the “Program”, which is the highest level mode of the simulator. Further lines of the menu comprise adjustable options for this program. There are driving programs like “Driving School” and menus for special adjustments like “Options”, “Service“, or „Replay“, which are not meant to start a ride. For faster navigation between the real driving programs, the three menus “Options”, “Service” and “Driver’s Data” can be configured to be submenus of a single “Settings” menu. In this case, they are accessed by choosing “Settings” in the first line and then “Options”, “Service” or “Driver’s Data” in the second menu line.

While driving programs are described in corresponding chapters, this document focuses on the non-drive menus below (the last one is not a menu, but rather an operation mode):

1. **Options**
2. **Service**
3. **Driver’s Data**
4. **Replay**
5. **Replay Playback**

1. Options

The options menu allows the adjustment of global parameters, which influence all driving programs. In addition to the options described here, the menu for your simulator could contain configuration entries for special hardware used in your simulator. Some options described here may be missing if they are not applicable to your simulator or are configured not be changeable.



1.1. Gearshift Options

This line allows switching the type of gear shift box. Usually, you can select between “Automatic gearshift” and “Manual gearshift”. Depending on the software version, you might find different and/or additional options special to your simulator hardware or alternative usage modes (e.g. handicapped accessibility).

1.2. Driveway Assistance

The driveway assistance makes it easier to start the car by making it harder to stall the engine. You can choose between “standard”, “strong”, “off” and “medium”.

1.3. Printout after ride

The scenarios can generate a printed evaluation, which contains a list of the driving faults made during the ride as well as the driver’s personal data (if entered using the corresponding menu). You can choose between “on” and “off”¹.

1.4. Report printout

Some scenarios can create special reports, which can be printed. You can choose between “on” and “off”².

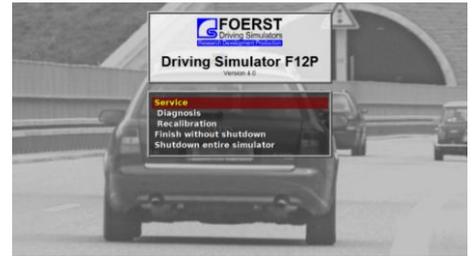
1.5. Voice Output

With this option you can choose which text should be spoken. With the option “standard” all instructions are spoken, with the option “nav. system only”, only the instructions of the route guidance system are spoken.

¹ For the latter to work, a printer must be connected to the system and be configured as Windows standard printer. Attention: Installing some printers may lead to subsequent performance problems of the simulator due to driver issues. Such issues are not covered by the warranty.

2. Service

The service menu offers some service functions as well as a diagnosis display. The latter is used by service technicians in order to quickly solve issues with your simulator in case they arise.



2.1. Diagnosis

The diagnosis display allows an assessment of the interface hardware as well as the connected sensors and switches. Thus, it is a valuable tool, if something should not function as expected.

The diagnosis display can also be activated at any time using the pc keyboard and the key combination <Ctrl>+<F1>.



You can also start a ride (although you cannot see the settings for the newly started ride) while the diagnosis display is active. Turn the ignition key to start the ride selected in last shown driving program menu.

Before the ride, the diagnosis display can be switched off using either “Line” or “Mode”, which returns you to the main menu.

If your simulator is equipped with a Kinect sensor for view detection, its video signal is displayed in addition to other measurements. The camera must be adjusted such that in normal driving position the driver’s head is completely visible and at or slightly above the centre of the video image.

The values in the diagnosis display are structured as follows:

- a. Raw analogue inputs
- b. Processed analogue Inputs
- c. Active digital inputs
- d. Active digital outputs

a. Raw Analogue Inputs

These values are input measurements from the hardware installed in your simulator. The values are interpreted by the software and then used as input values for the simulation. The actual values may be different from simulator to simulator, but you may be asked for them by a service technician.

b. Processed Analogue Inputs

The above described raw analogue inputs are processed to yield the simulation input values. This translation may need to be changed if the simulator is moved or in reaction to larger environmental changes. This is done in the Calibration process (see section 2.2). We now assume, a calibration has already been performed.

Then, the processed values vary from 0 to 100 per cent. The first step for error diagnosis is to observe these values and compare them to actual hardware input.

Accelerator pedal released: 0 %
 Accelerator pedal fully activated: 100%
 Brake pedal released: 0%
 Brake pedal fully activated: 100%
 Clutch pedal released: 100% (transmission)
 Clutch pedal fully activated: 0% (declutched).

If not configured differently, the processed values change linearly between the above values as a function of the corresponding raw analogue inputs².

After steering wheel initialization, the steering wheel angle, relative to straight motion position, is indicated in degrees.

c. Active Digital Inputs

Digital inputs are e.g. ignition key, starter, blinker, light switch, safety belt lock, wiper switch and other digital inputs. They are shown both in raw form as a hexadecimal number and in interpreted form as textual descriptions of the currently activated inputs.

d. Active Outputs

The steering wheel torque is the feedback in per cent. It always vanishes when not driving, so don't expect other values unless you start a ride, when problems with the steering wheel motor can be diagnosed. The values in the last line refer to digital output values such as vibration motor activation state. You will only need to pay attention to these values if a problem arises and you are asked for them by a service technician.

2.2. Calibration

During the calibration process, the raw input range for the various analogue sensor inputs is measured and stored. These measurements are subsequently used to translate the raw sensor inputs into percentage values used by the simulation. A calibration becomes necessary, whenever the simulator is moved or e.g. the environmental temperature changes. It is also advisable to perform a calibration process from time to time to compensate the effects of wear and tear on the sensor and/or interface hardware.

During the calibration process, the computer asks you to press, hold and release the pedals, i.e. accelerator, brake and clutch. During the measurement, the current raw values are displayed, which may be interesting for a technician in case of problems. The calibration process may be cancelled by pressing the horn button.

2.3 Finish without Shutdown

Activating this entry quits the simulation program without shutting down the computer. After approx. 20 seconds, the program quits and you are left with the Windows desktop. This option is e.g. needed in order to perform a software update.

2.4 Shutdown

Activating this entry completely shuts down the computer. This process takes about 30 seconds, after which the simulator may be physically powered off.

² The translation of raw sensor values to pedal percentage values can be customized using in the configuration file (C:\Pkw\SimuConf.cfg). For details please have a look at the comments on the configuration keys *IO_Brake_Response*, *IO_Accelerator_Response* and *IO_Clutch_Response* in *C:\Pkw\SimuConf-Reference.cfg*.

3. Driver Data

The driver's data menu allows to enter user data for the personalized use in e.g. driving schools. This menu is only available, if your software license comprises the driving school program.

It offers entering the following data items:



3.1. Driver Id

Here, a short identification is entered, which is later used to load the driver data. Usually, a shortened form of the driver's name or an identification number is used. Please note, that not all letters are allowed for this id.

3.2. Name

This allows the input of the full user's name.

3.3. Gender

This allows the input of the user's gender (mainly for salutation purposes). Please use abbreviations "m" = male and "w" = female.

3.4. Date of Birth

Allows to input the user's date of birth.

3.5. Comment 1

A line of free text for the use of e.g. the driving school.

3.6. Comment 2

Another line of free text.

3.7. Load Data

Activating this line using the "Mode" button causes the driver data identified by the currently entered driver Id to be loaded. Both success and failure of the load process are acknowledged by a corresponding audio signal.

3.8. Save Data

Activating this line using the "Mode" button causes the currently entered user data to be saved under the given driver Id. A successful save process is acoustically acknowledged.

4. Replay

The replay menu allows to play back a “replay” of the last 10 rides. A “replay” is a recording of the ride, which can be played back either from the driver’s perspective or as seen from outside the vehicle. Optionally, you can display additional diagrams showing various physical data items as they vary over time (e.g. position of the brake pedal,...)



4.1. Show Replay

Activating this entry with the “Mode” button starts the replay selected below with display of the selected additional data items.

4.2. Display Data

Here, you can select the additional data items to be displayed. You can choose between “None”, “Economical” and “Safety”.

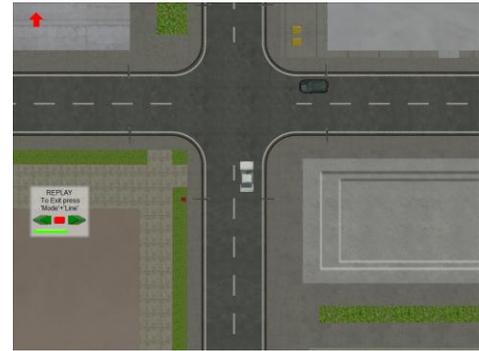
4.3. Choice of ride

Here, you can select the ride, for which you want to show a replay. You can choose between the last 10 rides performed on the simulator, presented in reverse order: The last ride appears first, the second last second and so on. The entries are labeled similar to the selections made in the menu to start the ride. If there is still no replay data present, then “-not available!” is displayed.

5. Replay Playback

Replays may be started either at the end of a ride or through use of the Replay menu. The simulator then switches to “Replay mode”, the recorded data is played back and data is displayed.

A small control window shows the playback state and the time position.



The following interactive controls are possible:

- The Button “Enter” allows you to change perspective between the driver’s perspective and views from outside the vehicle.
- You can use the “Mode” button to fast forward the playback.
- You can use the “Line” button to stop or rewind the playback.
- Pressing and releasing both “Mode” and “Line” quits the replay mode and brings you back to the previous menu (i.e. either evaluation after the ride or main menu).

In addition, the replay playback can be influenced using the steering wheel:

- In neutral position, the replay runs with original speed.
- Turning the wheel to the right makes playback faster (fast forward).
- Turning the wheel to the left makes playback run slower (slow motion) or even backwards (rewind).

6. Control Element Variants

In the past, most simulators were delivered with a small control unit with the two buttons “Line” and “Mode”. The button “Enter” was usually found on the simulator’s housing. Since some simulators don’t have an “Enter” button, a drive can alternatively be started by turning the ignition key.

Alternatively, the buttons “Line” and “Mode” can be located on the simulator housing just like the “Enter” button.

If your simulator has a navigational cross (e.g. on a remote control unit), the functionality of the “Line” button is mapped to “down”, while “Mode” is mapped to “right”. In the menu, the opposite directions cause inverse actions. Thus, a faster intuitive menu navigation is possible. The “Enter” button may be labelled “OK”. A button labelled with a small house symbol found on a remote control unit can be used to cancel a ride or leave replay mode³.

³ This button has the same meaning as simultaneously pressing “Line” and “Mode”. This is particularly more intuitive than moving a navigational cross in south-east direction, which is also possible. At simulators with buttons labelled “A” and “B”, pressing these buttons simultaneously cancels a ride or leaves the replay mode.

10.05.2011

Eco-Driving

This program allows the permanent computation and the display of the current and average fuel consumption during a simulation ride.

In order to make best use of the Economy measurement system, a sight system with more than one monitor is needed. The program can then be used to display a dynamic engine map on one of the side monitors or an additional external monitor. In addition, the most relevant physical quantities influencing the fuel consumption are displayed as functions of time. A simplified version of this display (current and average consumption only) in textual form can alternatively be shown on the main monitor.

The following techniques for fuel-efficient driving can be trained:

- fast acceleration
- overrun fuel cutoff by engine braking when decelerating
- early gear switching, using the highest possible gear when driving uphill
- avoidance of unnecessary braking and acceleration manoeuvres
- anticipatory driving style

This program offers four options:

1. Course
2. Traffic density
3. Diagram type
4. Diagram time



Besides these choices "Economic Driving" may also be influenced by other options. In this sense, for instance the gear shift may be preselected (in the option menu). Please consider the menus "Service" and "Options".

1. Choice of the course

With this feature you can choose the world, in which you want to drive.

1.1. City

The driver drives through city traffic. His route leads across several crossroads, in part with traffic lights. His objective is to keep fuel consumption down – mainly through an anticipatory driving style.



1.2. Suburban area

The student starts from a parking place beside a rural road. The route leads him through a village and on a rural road.



1.3. Rural Road

The student drives on a rural road. The route features e.g. road works with speed limits and a junction with traffic lights. Again, the objective is to keep fuel consumption down by means of an anticipatory driving style.



1.4. Motorway

The driver enters a motorway and later leaves it again. In addition to an anticipatory driving style, fuel consumption can be reduced by keeping braking manoeuvres and acceleration to a minimum.



1.5. Mountains

The driver enters a mountain range with a steep rise and leaves it on a steep descent. The objective is again to keep fuel consumption as low as possible.



2. Choice of traffic density

The traffic comprises about 30 traffic users with artificial intelligence, including passenger cars, trucks, pedestrians, bicycles, and special vehicles, which obey the traffic rules, keep distance to the forgoing vehicles, obey the speed limits, stop in front of a red traffic light and in front of crossing traffic, accelerate and decelerate in a natural way and may be overtaken. The approaching cars stop and make a jam, when you are on the left side of the road. The adjustment in this menu line defines only the quantity of the approaching vehicles.

2.1. Reproducible traffic

Other vehicles drive on fixed routes. So a comparability between several rides is ensured. This option is not available for the courses "Motorway" and "Mountain". Instead, you have the option "Sparse Traffic". This option behaves like the option "Normal Traffic", but with fewer vehicles.

2.2. Normal Traffic

Other vehicle are driving randomly on the course. They regard the traffic rules, but the may appear in different situations. So a comparability over several rides is not ensured.

2.3. No Traffic

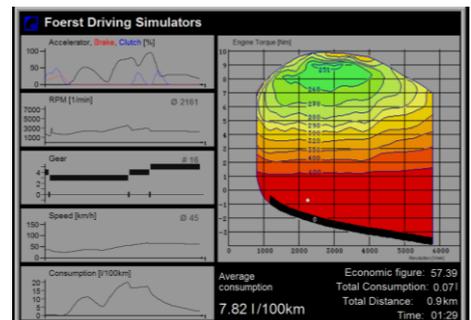
No vehicles are generated. The driver is alone on the course.

3. Choice of diagram type

Additional diagrams can be shown during the ride.

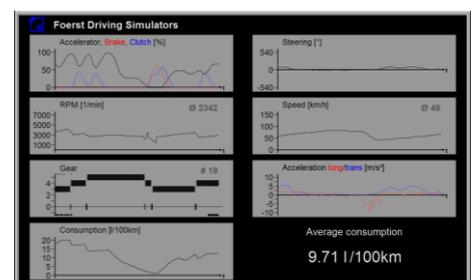
3.1. Eco

This diagram shows beside different vehicle parameters, which influence the fuel consumption, an engine map, which visualizes the actual specific fuel consumption. More you can find under 5. Visualization and Engine Map.



3.2. Safety

This diagram shows different vehicle parameters like pedal position, revolutions, gear, steering angle or fuel consumption as a function of time.



3.3. Off

No diagram will be shown.

4. When are diagrams shown

This option is only selectable, if either Eco or safty is choosen.

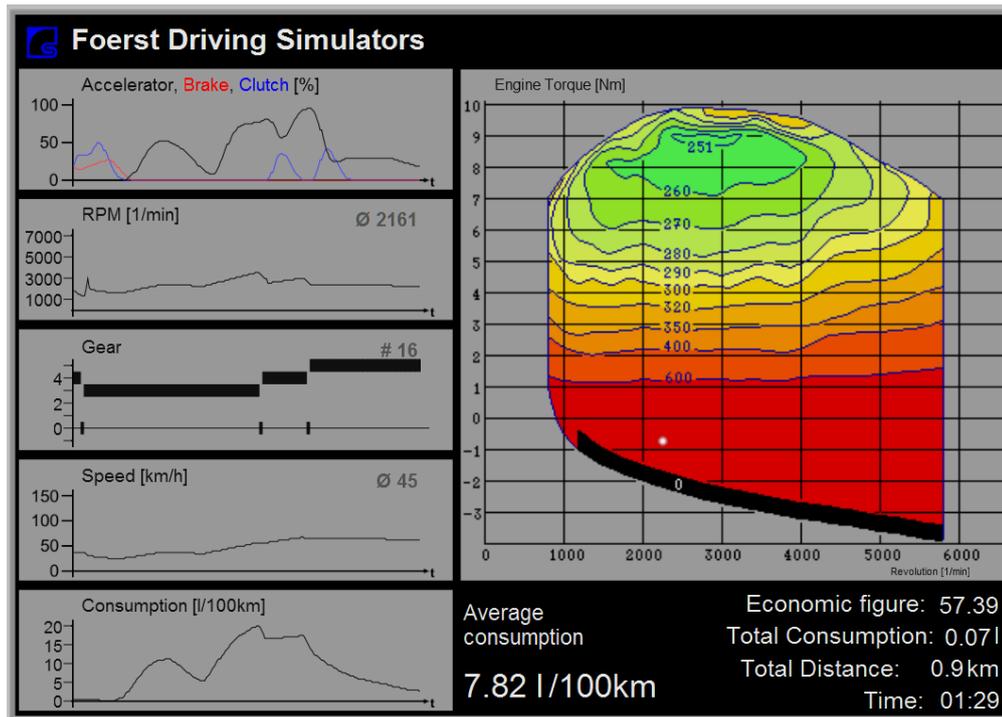
4.1. Only during Replay

The selected diagram is only shown during a replay.

4.2. During Ride and replay

The selected diagram is shown during ride and replay.

5. Visualization and Engine Map



The fuel consumption of the simulated medium-class passenger car is calculated as a function of motor torque and revolutions per minute.

The position of the accelerator pedal, the speed and the current fuel consumption are diagrammatically shown as functions of time. The average fuel consumption is also constantly calculated and displayed. The specific fuel consumption (i.e. fuel consumption in relation to power output) is displayed as a point in the engine map to the right of the other diagrams.

The engine map visualizes by graphical means the physical fact that combustion engines work most efficiently at low revolutions per minute and almost open throttle valve. The axes represent the revolutions per minute and the mean piston pressure. The latter is proportional to the engine torque. The blue lines are lines of constant specific fuel consumption. The areas between them are coloured green for low consumption to red for high consumption.

A small marker square shows the current working point of the engine as determined by the trainee's driving style.

By observing the movement of the working point, one can see how the driving style influences the fuel consumption. Not only does the consumption rise with rising speed, but also it falls when choosing higher gears. By carefully choosing the right combination of torque and revolutions per minute when accelerating or going uphill, it is possible to save fuel while still moving swiftly.

Road Safety

The program "Road Safety" is meant to be used for hazard perception training. To this end, it offers a set of scenarios featuring critical situations in various surroundings. The driver is required to properly react in order to prevent an accident. The program „Road Safety“ also replaces the program „Alcohol Simulations“ contained in former versions of the F12 software: Using an alcohol simulation, the traffic scenarios and the contained hazard situations can be used to demonstrate the dangers of driving under the influence of alcohol.

The program offers the following choices:

1. Surrounding
2. Variant
3. Weather
4. Dangerous events
5. Alcohol simulation: Mode
6. Alcohol simulation: BAC
7. Safety systems
8. Error Messages
9. Diagram type



As a special "Surrounding", you can additionally find the subprograms "Reaction Tests" and "Random". "Random" randomly selects a surrounding and variant. The subprogram "Reaction Tests" can be used to perform raw reaction time measurements and is largely different from all other scenarios.

In addition to the choices listed above, the program „Road Safety“ can be influenced by further options. As an example, the type of gearbox (manual or automatic) can be chosen. Please have a look at the Options menu.

Depending on the type of simulator or sight system, some options or scenarios may not be available, e.g. because they would not be drivable without side view screens.

1. Choice of Surrounding

Using this menu item, the general type of surrounding for the scenario is chosen. The following types of surrounding can be selected:

1. City
2. Rural Road
3. Motorway
4. Mountains

In addition, a random selection and two reaction test scenarios are available.

1.1. City

In this category, four scenarios of approximately three minutes each can be selected:

1. After starting just in front of a town entry, the driver passes bus stops and several parked cars. Finally, he has to traverse a busy roundabout.^{**}
2. The ride starts on the parking lane of a two-lane road. It continues over a traffic light junction to a one-lane road and past some parked cars.^{***}
3. Several traffic light junctions must be passed. Between the junctions, road works force the driver to change lanes. This ride does not offer additional dangerous situations.^{*}
4. This ride is similar to the first choice, but in addition the driver has to turn off and cross a roundabout.^{*}
5. Among other things, this ride contains a starting bus and a car reversing out of a parking space. This ride contains turns.^{*}



1.2. Rural Road

This category comprises four scenarios:

1. The driver must cover a distance on rural roads and through a small town. He passes parked cars and forested areas and must overtake a bicyclist. Due to the narrow roads, particular attention must be paid in order not to collide with oncoming traffic. This ride lasts longer and takes approximately six minutes.^{***}
2. After starting at a parking lot at a rural road the ride spans hilly roads, passes through a small town and continues to a small forest. This ride takes approximately three minutes.^{***}



^{**} This variant can be used without side screens with some limitations (the driver must refrain from driving manoeuvres, which require the use of side mirrors).

^{***} This variant can be used without side screens.

^{*} This variant cannot be used without side screens.

3. This ride on narrow roads takes approximately four minutes. Halfway down, a small village is passed.^{***}
4. The ride starts at a bus stop immediately before leaving town. It continues along a straight, some 90° curves and some junctions back to town. The ride ends after approximately three minutes.*

1.3. Motorway

There are two scenarios in this category:

1. The ride starts in front of a motorway entry. The driver must merge into the traffic and must overtake a slow truck. The appropriate distance to the vehicle in front must be kept. The ride ends after leaving the motorway and takes approximately five minutes.*
2. This ride starts at a motorway service station. During the ride, the appropriate distance to the vehicle in front must be kept. Shortly after the service station, the motorway grows from two to three lanes. The ride takes approximately four minutes.*



1.4. Mountains

There is only one scenario in this category:

1. A mountain road leads through tunnels, a bridge, a long downhill section and serpentine.^{*}



1.5. Random

The computer selects a random surrounding and corresponding variant as described in the preceding sections. If you choose “Single Ride”, the simulator behaves just as if the corresponding menu entry had been selected. If you choose “Endless”, the simulator does not return to the menu after a ride has been completed and the corresponding evaluation has been shown. Instead, another random surrounding and variant is selected. This mode can be left by pressing both “Line” and “Mode” for more than 3s. If present on your simulator, you can alternatively press “Home” for more than 3s.

1.6. Reaction Tests

In this special category, you can choose between two scenarios, which are tailor-made for raw reaction time measurements. In one of the two scenarios, the driver must react to deer jumping onto the road, while the other one features virtual stop signs.

These reaction test scenarios largely differ from the other scenarios. Therefore, the available options are also different. You can control the traffic density, the weather and the diagram display. For the virtual stop sign ride, the number of measurements (three or five) can be chosen.



2. Settings

In addition to the choice of surrounding and scenario variant, there are additional parameters to be adjusted. For all parameters, the standard setting is underlined.

- Weather
 - Nice
 - Rain
 - Fog
 - Night
 - Twilight
 - Snow

- Dangerous events
 - Dangerous events
 - Without Reaction

If „Dangerous events“ is activated, the program creates several critical situations at fixed positions matching the surrounding. As a rule of thumb, these situations are created by more or less severe violations of traffic rules by other road users. For the purpose of alcohol prevention, this may call for some explanation by the supervisor. Otherwise, the driver might blame an accident to malicious behaviour of others instead of his own alcoholisation.

In addition, further dangerous events can be created using a numeric keypad. Please note, that excessive use of such events can disturb a scenario's flow and make it behave strangely at later times. Before using the numeric keypad for event insertion, this feature must be enabled in the F12 software configuration.

- Alcohol simulation: mode
 - On
 - Off
 - Comparison

If you choose the mode “Comparison”, the alcohol simulation is only activated after a sober adaption phase.

If alcohol simulation is turned on, a graphical alcohol effect and a time delay¹ are activated. The strength of these effects depends on the chosen blood alcohol content (BAC, see below). The steering delay in particular will make a sober driver drive a zig-zag route like under the influence of alcohol. This will also make it harder and harder to cope with the various hazard situations.

- Alcohol simulation: BAC
(blood alcohol content, only accessible, if alcohol simulation turned on)
 - 0.03 percent
 - 0.05 percent
 - 0.08 percent
 - 0.11 percent
 - 0.16 percent
 - Calculator

If “Calculator” is chosen, the user is prompted to enter some personal data and the type and number of drinks. Using this data, the formulae of Widmark² and Watson³ are used to calculate the BAC⁴. The time of start of drinking is assumed to be three hours before the subsequent ride.

If “Calculator” is chosen together with “Alcohol simulation: Comparison”, the calculator is started in the middle of the ride. At the same place, where the alcohol effect would have been activated for explicit BAC values, the driver is stopped and the calculator is started. After all data has been entered, the ride is continued with the calculated BAC value.

- Choice of security systems:
 - none
 - ABS (anti-lock braking system)
 - ABS + ESC (anti-lock braking system and electronic stability control)
- Error messages
 - On
 - Off

¹ According to Winninghoff, Schmedding und Schimmelpfenning (*Die Reaktionszeitverlängerung bei Dunkelheit unter Alkohol- und Blendungseinflüssen – Ergebnisse aus Laborversuchen*. Verkehrsunfall und Fahrzeugtechnik (2001)) the minimal reaction time is not enlarged by the influence of alcohol, but the statistic spread is including a shift of the distribution centre towards longer reaction times. In other words, the probability of not reacting within a given time span rises. Random reaction time enlargements are not easily integrated into a simulation software and in addition are of questionable pedagogic value. Therefore, the F12 software uses a constant reaction time enlargement corresponding to the time, after which half of the test persons reacted. The above paper does not allow reconstructing the precise curve of reaction time delay as a function of the BAC, whence we use a simple linear dependency. Using this ansatz, the numbers in the above paper imply a reaction time delay of approximately 2.8s per percent BAC. While the pedal positions are simply delayed by this amount, a corresponding delay of the steering wheel does not feel natural, because a constant delay contradicts experience. Therefore, we use a smoothing function with comparable time constant instead of the delay.

² E.M.P. Widmark: *Die theoretischen Grundlagen und die praktische Verwendbarkeit der gerichtlich-medizinischen Alkoholbestimmung*. Urban und Schwarzenberg, Berlin Wien (1932)

³ Watson, Watson & Batt: *Total body water volumes for adult males and females estimated from simple anthropometric measurements*. The American Journal of Clinical Nutrition 33 (1980)

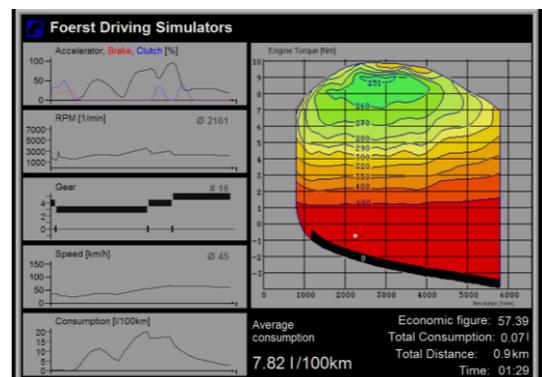
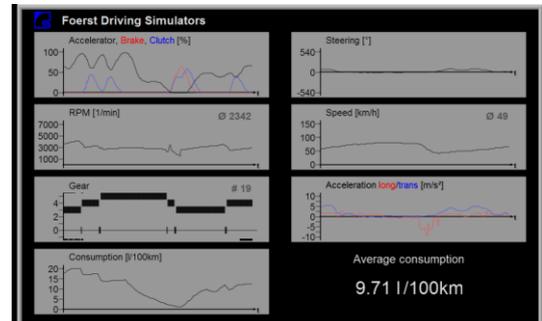
⁴ Modifications of the Widmark and Watson formulae, as may be found e.g. in the German Wikipedia, are not backed by scientific papers. Therefore, we do not use them.

Using this option, the display of driver fault messages during the run can be turned on or off. By turning off the messages, the driver is not warned or distracted during the ride, which might be essential if undisturbed measurements are required. Driver's faults are always displayed in the evaluation table at the end of the ride.

- Choice of diagram type:
 - Security
 - Eco
 - Off

Optionally, informative diagrams can be shown. You can choose between a security diagram and an economy diagram. The security diagram presents several driving parameters such as pedal positions, steering angle, longitudinal and transversal accelerations. The economy diagram presents the fuel consumption and the engine's working point in form of a performance map.

If you choose one diagram type, the diagram will be shown during the ride and during the replay. If you choose the option "off", there will be no diagram during the ride, but the security diagram during the replay.



3. Evaluation of dangerous events

Some dangerous events support an advanced evaluation, if that is not deactivated by the configuration.

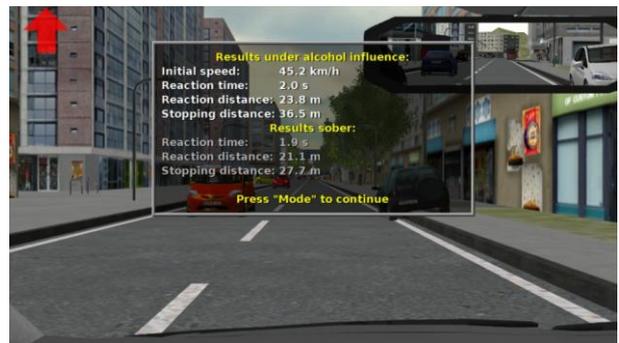
After such a dangerous situation a blinking (i) appears in the upper right corner of the centre screen.

By pressing the Mode button the evaluation is shown while the simulation is stopped. The button can be changed by the configuration.

On the evaluation table, the velocity at the beginning of the event, the reaction time of the driver and the corresponding reaction distance as well as the stopping distance are shown. If the driver has not braked to a complete stop, an estimated stopping distance is determined by extrapolating the measured braking behaviour.

If the driver was driving under the influence of alcohol or he was on a comparison ride and still on the sober part, additional extrapolated values for sober / under the influence of alcohol are shown to compare the values with each other.

As these extrapolated values as well as the possibly extrapolated stopping distance do not directly correspond to the ride, they may need the explanation of an advisor. In certain situations (e.g. very uneven braking pressure) extrapolated values may even appear absurd.



4. Evaluation

At the end of every road safety scenario a "Score" will be calculated and shown in the evaluation table. Based on 100% points are subtracted for every mistake during the ride. To the bottom the score is limited to 0%.

The number of subtracted points depends on the type of error. There are four categories of errors: accidents, severe traffic rule violations, less severe traffic rule violations and bad driving style.

Rev. 2014-05-13

Motorsports

With the aid of your Foerst simulator drivers can be taught how to handle a vehicle when going to extremes. The simulator offers the choice between a state-of-the-art race course with narrow curves, falls and rises, a blocked off rural road, which is easier to handle and a second state-of-the-art race course.

The training gives the driver a good insight into the physics of driving and helps develop an experienced and steady driving style in all situations. In addition, it offers a fun aspect, the real-world counterpart of which is not easily accessible to driving trainees.

Some of the aspects of driving physics, which can be shown using the Motorsports program are:

- Loss of road grip due to centrifugal forces
- Loss of wheel grip due to acceleration and deceleration
- Interaction between lateral and longitudinal forces (accelerating forces reduce lateral support and vice versa)
- Stabilization of a sliding vehicle by countersteering (and: this is not easy!)

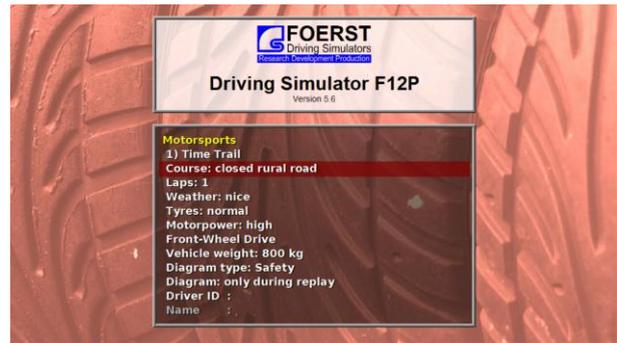
It should be noted, that driving under extreme conditions uncovers some fundamental restrictions of driving simulators, because the forces on the driver cannot be felt to the full extent as in reality. This leads to a systematic underestimation of the true speed of the own vehicle, making it harder to feel the limits of the own car than in reality. This problem is partially addressed by a slight exaggeration of car inclination. Nevertheless, in the simulator it is harder to go to the limits than in reality and easier to cross these limits. For the fun aspect, we therefore offer a special kind of 'tyre' with unrealistically good road contact.

The aforementioned aspects of driving physics are best tried in Time Trail mode. For the fun aspect, the Motorsports program also offers a Race mode, where the driver enters a contest against simulated opponents.

1. Time Trail

The program offers the following choices:

1. Choice of course
2. Number of laps
3. Sight and road surface conditions
4. Tyres
5. Motor power
6. Kind of drive
7. Vehicle weight
8. Type of diagram
9. Diagram display time



Besides these choices, “Motorsports” may also be influenced by other options. For instance, the gear shift may be changed. Please have a look at the “Options” menu.

1.1. Choice of Course

With this feature you can choose the world, in which you want to drive. The following courses are available:

- Green Valley Racing Circuit
- Closed rural road
- Further racing circuits (optional)

1.1.1 Green Valley Racing Circuit

This race course features narrow curves, rises and falls. Going fast on this course is quite demanding.



1.1.2 Closed Rural Road

Here, you drive on a rural road without intervening traffic. The course is much easier to handle and higher speeds can be reached.



1.1.3 Further racing circuits

Depending on the scope of delivery, additional racing courses may be selectable.



1.2 Choice of laps

All courses close to a round. You can choose, how often this round is to be driven. The available choices are:

- 1 lap
- 3 laps
- 5 laps.

1.3 Choice of the weather

Via the computer menu the following sight and road surface conditions can be selected. This makes it possible to make driving harder due to reduced sight and/or reduced road friction. The available choices are:

- Nice weather
- Fog
- Rain
- Night
- Twilight.

1.3.1 Nice weather

The light and sight conditions are optimal. The road surface is dry and gives a firm hold.



1.3.2 Fog

The sight distance is reduced to 80 m.



1.3.3 Rain

The road surface gets slippery. Weak friction of the tires on the wet road is simulated. This shows up at excessive centrifugal acceleration as well as at hard braking and full acceleration. In addition, the sight is worse than at nice weather.



1.3.4 Night

You have to switch on the light, and may drive with dimmed light or high beam. The viewing distance is reduced, but the friction of the road surface is the same as the one at nice weather.



1.3.5 Twilight

The sun is hanging low at the horizon. The scene is darker than at nice weather. The road surface corresponds to the surface at nice weather.



1.4 Choice of tyres

You have the choice between a realistic tyre simulation and unrealistically good tyres.

- Normal
- Arcade

1.5 Choice of motor power

Choosing a strong engine and a low vehicle weight (see below), you make the maximum acceleration larger. This makes the car faster, but on the other hand makes it much easier to exceed the physical limits.

You can choose between a sports car engine (approx. 110kW) and a weaker engine (approx 55kW).

- Strong
- Normal.

1.6 Choice of kind of drive

A front wheel driven car is much easier to handle than a rear wheel driven one. A rear wheel driven car can achieve larger accelerations, because inertia causes greater pressure on the rear wheels when accelerating. On the other hand, the rear wheels start sliding much more easily.

- Front wheel drive
- Rear wheel drive.

1.7 Choice of vehicle weight

See "Choice of motor power" above.

- 800 kg
- 1400 kg.

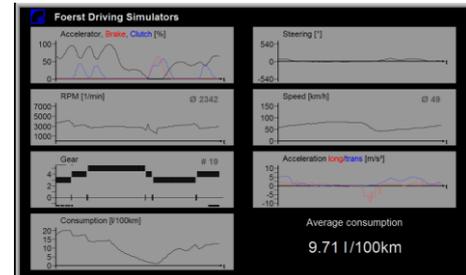
1.8 Choice of Diagram Type

As an overlay to the simulation screen, additional diagrams for ride analysis can be shown.

- Safety
- Eco
- Off.

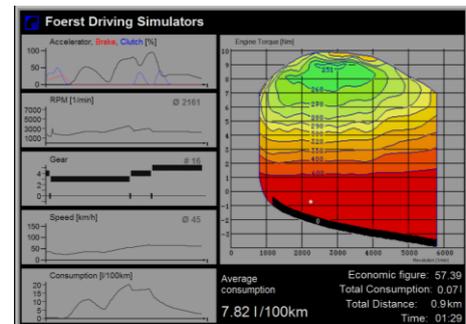
1.8.1 Safety

This diagram shows several vehicle parameters plotted over time. Examples are pedal positions, engine revolutions, choice of gear and steering angle.



1.8.2 Eco

In addition to several vehicle parameters influencing fuel consumption, a shell diagram showing the current specific fuel consumption is displayed.



1.8.3 Off

No diagram is shown.

1.9 Choice of Diagram Display Time

If a diagram type has been selected, you can control when the diagram is shown. Obviously, there is no point in specifying when to display no diagram.

- During Replay only
- During Ride and Replay.

1.9.1 During Replay Only

The diagram is only shown in the replay to assist ride analysis.

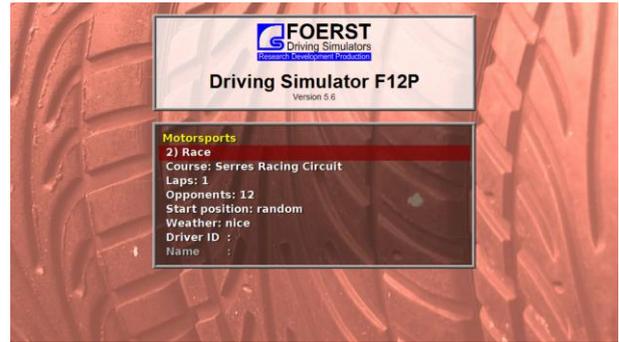
1.9.2 During Ride and Replay

The diagram is also displayed during the actual ride.

2. Race

The program offers the following choices:

1. Course
2. Laps
3. Opponents
4. Start Position
5. Weather



2.1. Choice of Course

With this feature you can choose the world, in which you want to drive. The following courses are available:

- Green Valley Racing Circuit
- Further racing circuits (optional)

2.1.2 Green Valley Racing Circuit

This race course features narrow curves, rises and falls. Going fast on this course is quite demanding.



2.1.1 Further racing circuits

Depending on the scope of delivery, additional racing courses may be selectable.



2.2. Choice of laps

Both available courses close to a round. You can choose, how often this round is to be driven. The available choices are:

- 1 lap
- 3 laps
- 5 laps.

2.3. Choice of number of opponents

Here you can choose the number of opponents for the race:

- 12 opponents
- 24 opponents.

2.4. Choice of Start Position

With this option you can choose your start position:

- Random
- Start Position 1
- ...
- Start Position “number of opponents”.

2.5. Choice of the weather

Via the computer menu the following sight and road surface conditions can be selected. This allows to make driving harder due to reduced sight and/or reduced road friction.

The available choices are:

- Nice weather
- Fog
- Rain
- Night
- Twilight.

2.5.1 Nice weather

The light and sight conditions are optimal. The road surface is dry and gives a firm hold.



2.5.2 Fog

The sight distance is reduced to 80 m.



2.5.3 Rain

The road surface gets slippery. Weak friction of the tires on the wet road is simulated. This shows up at excessive centrifugal acceleration as well as at hard braking and full acceleration. In addition, the sight is worse than at nice weather.



2.5.4 Night

You have to switch on the light, and may drive with dimmed light or high beam. The viewing distance is reduced, but the friction of the road surface is the same as the one at nice weather.



2.5.5 Twilight

The sun is hanging low at the horizon. The scene is darker than at nice weather. The road surface corresponds to the surface at nice weather.



Rev. 2014-06-18

Fitness to Drive

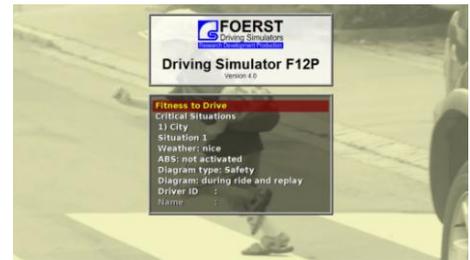


The term “Fitness to Drive” comprises different abilities, a good driver should have. This program offers scenarios to test or train some of these abilities. The available scenarios fall into two categories: Reaction tests and long term measurements.

1. Menu

The “Fitness to Drive” menu page allows to select the current student and to select the next exercise.

1. Program title (use to switch e.g. to the “Edit User Data” page)
2. Choice of test category
3. Choice of “scenario”
4. Settings
5. Driver Identification



1.1. Program Title

Using the first (yellow) line, you can switch to other driving programs or to various settings pages. Refer to the “Description of the Menu Control” chapter for details.

1.2. Test Categories

The second line allows you to choose between two test categories, which in turn determines the scenarios you can select in the line below. The following categories can be selected:

1. Reaction test
2. Long term measurement
3. Hazard situations

1.3. Choice of Scenario

Here, you can choose between the different scenarios belonging to the selected category. You will find an overview about the available scenarios in each category in section 2 “Scenarios”.

1.4. Settings

Depending on the selected scenarios, you can make various adjustments. For a description of the available settings, refer to section 2 “Scenarios”.

2. Scenarios

This section contains short descriptions of the available scenarios. It also lists the available options for each scenario.

2.1. Reaction test



The category “Reaction test” contains two scenarios to test the reaction time of the driver. The reaction time is a quite simple criterion for the fitness to drive, but offers very simple and comparable results. The available scenarios for reaction time measurement are:

- Stop sign
- Deers

Both scenarios contain events, to which the driver has to react and measure the reaction times. They offer similar variants/settings. The standard choice for each setting is underlined.

- Traffic Density
 - None
 - Sparse
 - Normal
- Weather
 - Nice
 - Rain
 - Fog
 - Night
 - Snow
 - Twilight
- Diagram Type
 - Safety
 - Eco
 - Off
- When are diagrams shown?

(only selectable, if either Eco or Safety is chosen)

- During Ride and Replay
- Only during Replay

2.1.1. Stop sign

During the ride, stop signs appear on the screen and the driver is supposed to stop the car. As an additional option, you can choose the number of measurements:

- 5
- 3

A report printout is available with

- Reaction time
- Reaction distance
- Braking distance
- Stopping distance
- Average reaction time



2.1.2. Deers

Five deers appear on the road. The driver must quickly brake in order not to hit them.



2.2. Long term measurement



After having been behind the steering wheel for a long time, your reaction time may increase, at worst, micro-sleep will be imminent. The simulator offers two scenarios, in which the effects of long term driving may be measured: Driving on a rural road or driving in a motorway road works. In both scenarios, the driver drives several “sections” of a given length. For each section, a “performance rating¹” is calculated and presented at the end of the ride. In adjustable intervals, reaction tests are performed, the results of which are also presented at the end of the ride. Comparing the figures, the adverse effects of long term driving can be measured.

The menu shows the following choices of scenario:

- Rural road
- Motorway

In addition to the choice of scenario, further parameters can be adjusted. The standard setting is underlined.

- Weather
 - Nice
 - Rain
 - Fog
 - Night
 - Snow
 - Twilight
- Choice of diagram type:
 - Safety
 - Eco
 - Off
- When are diagrams shown?
(only selectable, if either Eco or Safety is chosen)

¹ The rating is calculated from track deviation and driving faults. It offers a measure for good driving performance ranging from 0% (horrible) to 100% (perfect)

- During Ride and Replay
- Only during Replay

2.2.1. Rural road

Additional options:

- Sections
 - 1 section (a 6.3 km)
 - 3 sections (a 6.3 km)
 - 5 sections (a 6.3 km)
 - 10 sections (a 6.3 km)

- Reaction test
 - Every minute
 - Every 2 minutes
 - Every 5 minutes
 - Every 10 minutes



2.2.2. Motorway

Additional options:

- Sections
 - 1 section (a 5.2 km)
 - 3 sections (a 5.2 km)
 - 5 sections (a 5.2 km)
 - 10 sections (a 5.2 km)
 - Infinite

- Reaction test
 - Every minute
 - Every 2 minutes
 - Every 5 minutes
 - Every 10 minutes



2.3. Hazard Situations

This block comprises several very short scenarios. Each of these contains a single hazard situation (with reaction measurements). In contrast to the reaction tests described in section 2.1 the reaction tests work with realistic hazard situations. As such situations can often be coped with in different ways other than just pressing the brake. Hence, an evaluation of test results must always involve the judgement of a human examinant.

The menu offers situations in the following surroundings:

- City
- Rural Road
- Motorway
- Mountains

For all situations, the following options can be adjusted:

- Weather
 - Nice
 - Rain
 - Fog
 - Night
 - Twilight
- ABS:
 - Not activated
 - Activated
- Choice of diagram type:
 - Safety
 - Eco
 - Off
- When are diagrams shown?
(only selectable, if either Eco or Safety is chosen)
 - During Ride and Replay
 - Only during Replay

08.08.2013

Manoeuvring with a Trailer

Using this program driving a passenger car with a trailer can be trained. In different scenarios both driving forwards and backwards with a trailer will be trained. For this program a multi-channel sight system is highly recommended, because the rear view mirrors, which are essential for manoeuvring, are display on the side screens.

The program offers four options:

1. Scenario
2. Scenario dependent options
3. Additional mirrors
4. Diagram type



Besides these choices "Manoeuvring with trailer" may also be influenced by other options. In this sense, for instance the gear shift may be preselected (in the option menu). Please consider the menus "Service" and "Options".

1. Choice of scenario

This program offers seven scenarios with different driving tasks.

1.1. Driving with trailer

The driver has to pass a route with many turnings. For this scenario it is possible to choose whether or not to have other vehicle on the road.

- Traffic: none
- Traffic: normal



1.2. Slalom around Pylons

The driver is supposed to drive through a traffic cone course without hitting the cones. Additionally you can choose to complete this exercise forwards or backwards.

- Direction: forwards
- Direction: backwards



1.3. Following the Road

The driver is to train driving backwards.

Selectively the route is winding or straight and the task is either to keep to the own lane or to the whole road.

:

- Route: straight
- Route: winding
- Width: whole road
- Width: one lane



1.4. Turning with Side Road

The driver should train the two different procedures to turn with the help of a side road.

- Procedure: Backwards – Forwards
- Procedure: Forwards – Backwards

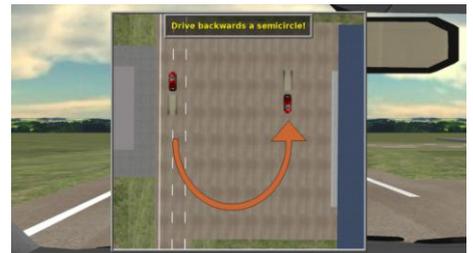


1.5. Circle Drive Backwards

The student should drive a semicircle in backwards direction. After the manoeuvre, the vehicle should stand in straight position.

The scenario comes in two variants:

- Direction: left
- Direction: right



1.6. Parking Backwards

The driver is ordered to reverse into a gate.

It is possible to choose from which side he is coming and the width of the gate.

- Direction: left
- Direction: right
- Target Width: 7m
- Target Width: 4.5m



1.7. Free manoeuvring

The driver has the possibility to train manoeuvring in different situations on a work yard. This scenario has two difficulty levels:

- Difficulty: easy
- Difficulty: hard



2. Choice of additional mirrors

The program offers the opportunity to show virtual additional mirrors. With the help of these mirrors the driver can see along his trailer. These mirrors can be switched on or off:

- Additional mirrors: on
- Additional mirrors: off

3. Choice of diagram type

Additional diagrams can be shown during the ride.

- **Off**

No diagram will be shown during the ride. During the replay the safety diagram will be shown.

- **Safety**

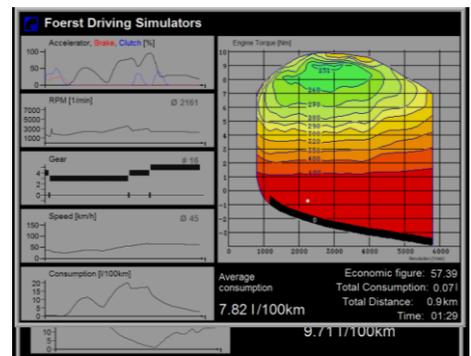
This diagram shows different vehicle parameters like pedal position, revolutions, gear, steering angle or fuel consumption as a function of time.

If this option is chosen, the safety diagram is shown during ride and replay.

- **Eco**

This diagram shows beside different vehicle parameters, which influence the fuel consumption, an engine map, which visualizes the actual specific fuel consumption.

If this option is chosen, the Eco-diagram is shown during the ride and the replay.



Rev. 2015-10-28

Free Driving

“Free driving” means, that you do not have to obey a training curriculum or are exposed to a fitness assessment, but that you may choose your speed and track by your own. Several parameters for the drive may be adjusted in the menu.

The program “Free Driving” offers the following choices:

1. Various environment types
2. Various starting points
3. Various sight and road surface conditions
4. Traffic density
5. ABS
6. Driving Time
7. Type of diagram



Besides these choices “Free Driving” may also be influenced by other options. For instance, the gear shift may be changed. Please have a look at the “Options” menu.

1. Choice of Environment Type

With this feature you can choose the type of environment, in which you want to drive. The following environments are available:

1.1. Rural Road

The starting points are positioned on two different road networks.

1. The course begins with 2 km of curvy highway and 600 m city drive. Inside the city and at its end there are traffic lights. The course closes along a curvy highway. The road leads along a lake with sailboats through landscapes with forest and green. The round may be driven as often as you want.



2. A rural road with city transit. It largely differs from “Rural Road (1)” concerning houses, trees and other virtual objects. The road is much wider. It begins at flat, curvy land road, leads then in curves downhill and uphill again through a city with a choice to turn and drive via another street back to the entrance of the city. Is the choice straight ahead, the road leads via a bridge and aside a lake on a beautiful, curvy country road.



1.2. Urban Area

Here you find urban roads with a high density of junctions. Some roads have one, others two lanes per direction.



1.3. Motorway

The motorway comes in two variants: The first variant has two lanes, is mildly curved and runs through woody landscape. It has an entry and an exit. The second variant features a motorway service station. It switches between two and three lanes per direction. Both variants close to infinite loops and can be driven endlessly. In the first variant, the ride is ended when one leaves the motorway via the exit.



1.4. Mountains

In addition to a course through desert-like landscape this map in particular contains a mountain drive with steep bevels, serpentine roads, a bridge and tunnels. The ride starts right before the serpentine road.



2. Choice of the starting point

Most environments provide six different starting points.

3. Choice of the weather

Via the computer menu the sight and road surface conditions can be selected. Please note, that not all weather conditions can be selected for all courses.

3.1. Nice weather

The light and sight conditions are optimal. The road surface is dry and gives a firm hold.



3.2. Rain

The sky is cloudy, it is raining and the road is wet. The road surface is slippery. If you drive faster than 80 kilometres per hour, the aquaplaning effect sets in. This is simulated by a splash water noise and a forward swimming of the car, so that in most cases an accident is unavoidable. Furthermore, weak friction of the tires on the wet road is simulated. This shows up at excessive centrifugal acceleration as well as at hard braking.



3.3. Fog

The ride starts in fog with 80 meters sight distance. In the fog suddenly cars may approach, so that passing is dangerous. Depending on the environment, the fog may decrease and increase along the course of the road.



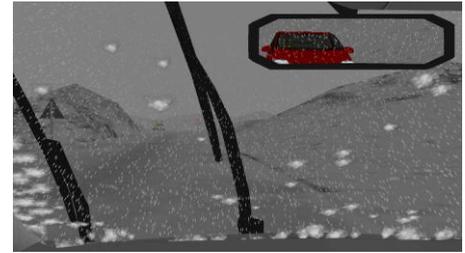
3.4. Night

You have to switch on the light, and may drive with dimmed light or high beam. The headlights throw natural, soft light-cones onto the road and objects. Traffic lights, house-windows, rear lights and headlights of other cars are illuminated. The friction of the road surface is the same as the one at nice weather.



3.5. Snow

The landscape shows winter colours. Mountains, fields and trees are snowy white. It is snowing and the road is covered with snow. The traction of the wheels is reduced. At accelerating they may slip. At higher speed the car starts sliding. At blocking wheels the vehicle's steering is not under control. All other cars drive with reduced speed. The program educates to very careful driving style with soft accelerating and braking and correct choice of gear.



3.6. Twilight

The sun is hanging low at the horizon. The scene is darker than at nice weather. The road surface corresponds to the surface at nice weather.



3.7. Winter

The landscape shows winter colours. Mountains, fields and trees are snowy white. In contrast to "Snow", the roads are cleared and the tyre traction is almost everywhere nearly as good as in nice weather.



4. Choice of Traffic Density

The traffic comprises about 30 traffic users with artificial intelligence, including passenger cars, trucks, pedestrians, bicycles, and special vehicles, which obey the traffic rules, keep distance to the forgoing vehicles, obey the speed limits, stop in front of a red traffic light and in front of crossing traffic, accelerate and decelerate in a natural way and may be overtaken. The approaching cars stop and make a jam, when you are on the left side of the road. The adjustment in this menu line defines only the quantity of the approaching vehicles.

4.1. Normal traffic

There is a normal quantity of vehicles in the virtual world.

4.2. Few traffic

The quantity of vehicles in the world is half as much.

4.3. No traffic

No vehicles are generated. The driver is alone on the course.

5. Choice of ABS brake

Using this option, the anti-lock braking system can be activated or turned off. The available choices are

- Activated
- Not activated

6. Choice of Driving Time

Use this option to limit the driving time of the scenario¹. The available choices are:

- Unlimited
- 3 minutes
- 5 minutes
- 10 minutes
- 15 minutes

¹ There may also be a Driving time setting in the Options menu. Then the ride is limited by the shorter time.

7. Choice of Diagram Type

As an overlay to the simulation screen, additional diagrams for ride analysis can be shown.

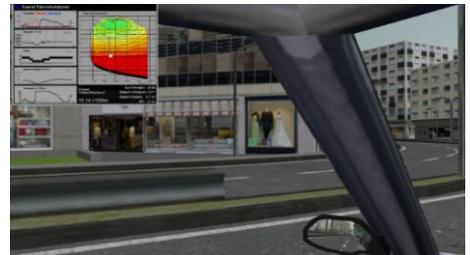
7.1. Safety

This diagram shows several vehicle parameters plotted over time. Examples are pedal positions, engine revolutions, choice of gear and steering angle.



7.2. Eco

In addition to several vehicle parameters influencing fuel consumption, a shell diagram showing the current specific fuel consumption is displayed.



7.3. Off

No diagram is shown during the ride. In the replay the Safety diagram is shown.

Driving School



The driving school program is the main driving program for all driving school oriented practice. It contains a number of exercises, called scenarios, grouped together in a number of training blocks. Each of these blocks is a set of scenarios useful for a certain level of experience of the student.

The program also implements a front end for the driver identification. The driver's name is used to mark both log files on the simulator's hard disk and printed fault lists. Printing fault lists can be activated in the "Options" menu.

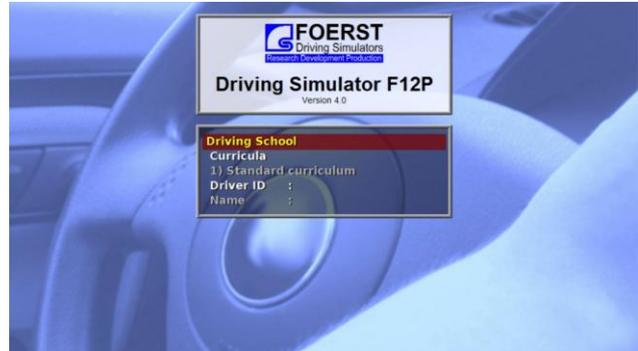
In the manual operation mode, the driving teacher uses the menu to select scenarios suitable for the current student's experience level. Thus, the training can be suited precisely to the experience level and capabilities of each individual student. The teacher must first become very well acquainted with all available scenarios of the driving school program. Only then, he can judge their suitability for a particular student.

In addition to the manual operation mode, the program offers a “Curricula” operation mode. In this mode, the program automatically leads the student through a series of scenarios. In order to use this operation mode, start a scenario from the special training block “Curricula”.

1. Menu

The Driving School Program menu allows to set the user and to select the lesson that should be practiced next.

1. Program title used to switch to other programs
2. Training block selection
3. Scenario selection
4. Difficulty level (optional)
5. Introduction (optional)
6. Diagram type
7. Time of diagram display
8. Driver identification



1.1. Program title

Using the first (yellow) line of the menu, the active program is chosen. Cycle through the available choices, until the “Driving School” program menu is shown.

1.2. Training block selection

In the first white line one can select between 5 training blocks and the Curricula collection. This selects the group of scenarios that can be chosen in the next line. The following blocks are available:

1. Curricula
2. Block A: Basic training
3. Block B: Intermediate training
4. Block C: Complex training
5. Block D: Special drives
6. Block E: Weather and sight conditions

1.3. Scenario Selection

This entry allows the selection of the scenario to be exercised. The range of scenarios that are selectable here depends on the training block chosen above. An overview of the available scenarios in each training block may be found in section 2 “Scenarios”.

1.4. Parameters (Variants/Introductions)

Some scenarios have adjustable parameters. In particular, some scenarios allow the choice between several variants or offer introductory texts. If available, you can adjust these parameters in corresponding menu lines.

1.5. Diagram Type

Optionally, informative diagrams can be shown. You can choose between a security diagram and an economy diagram. The security diagram presents several driving parameters such as pedal positions, steering angle, longitudinal and transversal accelerations. The economy diagram presents the fuel consumption and the engine's working point in form of a performance map.

1.6. Time of Diagram Display

The diagrams described above can be shown during the replay, during replay and ride or not at all.

1.7. Driver Identification

Usually, the current driver is identified by his account card after insertion into a connected chip card reader. In this case, this line contains a corresponding id code.

If used without a chip card reader, this line allows the entry of the driver's identification, i.e. his name or ID code. This name is added as identification to the log files and allows the collection of historic data about drives per user.

Activate the entry by pressing the 'mode' key, then enter the ID using the normal keyboard. Finish the input by either pressing 'Enter' on the keyboard or by pressing 'mode'. Please note, that only letters 'A' to 'Z' and numbers '0' to '9' are allowed characters of the driver identification.

If the driver ID is known to the system, it will display the corresponding proper name in the next line afterwards. Use the program (main menu item) "Edit user data" to add new user information to the system.

If you plan to only use the manual operation mode, the identification of the driver is not obligatory. It is only needed, if you want to later relate log files to drivers or if you want to create personalized print-outs.

If you want to use the automatic standard curriculum, you must either use a chip card reader or always enter a driver identification.

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2. Scenarios

The simulator offers a large collection of training scenarios. Each scenario usually has a length of one to five minutes and focuses on a particular educational goal.

2.1. Curricula

A curriculum is a collection of scenarios, which the trainee has to complete in sequence. Thus the trainee is automatically guided through the educational contents. You can choose between the following curricula:

- **Basic Training:** A selection of scenarios covering basic, intermediate and complex training topics.
- **Hazard Situation Training:** A selection of scenarios targeted at advanced drivers, which demonstrate examples of hazard situations.

When using one of these curricula, the student must be made known to the system. This is achieved by either using an account card (if a chip card reader has been installed) or using the keyboard. Only start the curriculum scenario after the driver has been identified.

Right after the curriculum scenario is started, the student is shown an overview page about his/her driving skills. New students see a welcome screen instead. During display of the overview page, you can either start the next scenario or leave the automatic driving school mode. After each scenario, the program returns to the overview page.

When you leave the automatic driving school mode at the end of a driving lesson, the current experience/skill level of the student is stored. In the next lesson, the training can be resumed at precisely the point where it previously ended.



A single scenario can be cancelled by pressing the home key on the remote control unit (labelled with a house symbol) or simultaneously pressing either the buttons “Mode” and “Line” or “A” and “B”.

The curriculum mode can be left by simultaneously pressing “Mode” and “Line” or “A” and “B” for at least 5 seconds.

The scenarios used by the curricula are subsets of the scenarios found in the Driving School program (c.f. the following sections) and the Road Safety program.

2.2. Basic training



2.2.1. Controls

The trainee is made acquainted with the positions and the functions of the most important operational elements of a vehicle. They comprise: Accelerator, brake, clutch, gearshift, light switch, windshield wiper switch, blinker, start button or ignition key with ignition and starter (depending on the simulator configuration).

2.2.2. Clutch-In

The trainee learns how to clutch. The objective is to repeatedly start and stop the car.

2.2.3. Gearshift

The student learns to start the car, clutch, accelerate and decelerate. Economic gear choice is also trained.

2.2.4. Stop and go

This is a "stop and go" exercise on a plane road.

2.2.5. Steering

The objective of this scenario is viewing distance and viewing direction on a rural road.

2.2.6. Parking a Car

The trainee is made acquainted with the steps involved in correctly parking a car.

2.2.7. Practice Drive

During a practice drive, the trainee expands on the handling of the clutch and switching gears.

2.3. Intermediate Training



2.3.1. Indicating and turning

During a ride through an empty urban area, the driver has to turn left and right. He trains correct usage of the indicator.

2.3.2. Junctions with Traffic Lights

The route leads across several junctions with traffic lights. This simple scenario is also useful for training to clutch in, start and switch gears.

2.3.3. Velocity

This scenario imparts a sense for correctly choosing the speed. To this end, the trainee drives through an urban area and a rural road with speed regulating signs. An additional graphical display informs about the currently recommended speed.

2.3.4. Stop and go at hillside

The driver hits a traffic jam moving uphill. He repeatedly has to stop and start again.

2.3.5. Reaction time and stopping distance

The student is confronted with several sudden situations. He should quickly react and perform a full braking. The reaction time is measured as well as the braking and stopping distance.

2.3.6. Parking

The student can train how to park in parking spots and parking bays. A full rear view is not possible with the simulator, thus you can only train manoeuvring using the rear mirrors. The driving teacher should enhance this scenario by giving additional instructions concerning the viewing behaviour.

2.3.7. Straits

It is not always possible to keep to one's own driving lane. The student trains the correct behaviour in narrowed traffic situations.

2.3.8. Engine Problems

During a rather uneventful ride on a country road, the oil lamp flashes as a sign that engine problems are on their way. The driver should remark this and stop the car, before the car is severely damaged.

2.4. Complex Training



2.4.1. Priority

In an urban area the route leads across several junctions with different priority situations. Other road users have a somewhat hesitating driving style in order to force the trainee to make decisions.

2.4.2. Road with equal Rights

In an urban area the route leads across several junctions. For various reasons (explicit signs, no signs at all, flashing traffic lights), both roads always have the same priority.

2.4.3. Stop Sign

In an urban area the route leads across several junctions. At each junction, the driver must bring his vehicle to a full halt in front of a stop sign.

2.4.4. Traffic Light Junction with Pedestrian

In an urban area with medium traffic the route leads across several junctions with traffic lights, where the driver has to turn left and right. The driver must respect the pedestrians crossing the destination road¹.

2.4.5. Traffic Rules

The objective of this scenario's three variants is adherence to various traffic rules (speed limits, right of way, regulating signs).

2.4.6. Following situation

The student trains keeping the right distance to the man in front. A virtual distance arrow signals an insufficient distance.

2.4.7. Overtaking

The student trains how to overtake slower vehicles. The difficulty levels differ in road shape and traffic density.

2.4.8. Sight and road conditions

This scenario's objective is choosing the right speed in fog and rain.

2.4.9. Gap Acceptance

In heavy traffic and various turning situations, the driver has to wait for an adequate gap in order to merge into the running traffic. He should neither endanger other traffic participants nor impede following traffic by waiting for an unnecessarily long time.

¹ In some countries, situations like this are prevented by the pedestrian traffic lights. In such countries, this scenario is of limited use.

2.4.10. Motorway

The driver trains merging into motorway traffic, leaving the motorway, overtaking, keeping distance and choice of speed and lane.

2.4.11. Overland journey

This scenario expands on the knowledge gained in the preceding scenarios.

2.5. Special Drives



2.5.1. Rural road

An interurban drive with occasional dangerous situations.

2.5.2. Suburb

Drives in suburban area, i.e. a mixture of rural roads and urban roads with one lane per direction. Occasional dangerous situations.

2.5.3. Urban area

The driver trains driving on urban multilane roads.

2.5.4. Motorway

The driver trains merging into motorway traffic, leaving the motorway, overtaking, keeping distance and choice of speed and lane.

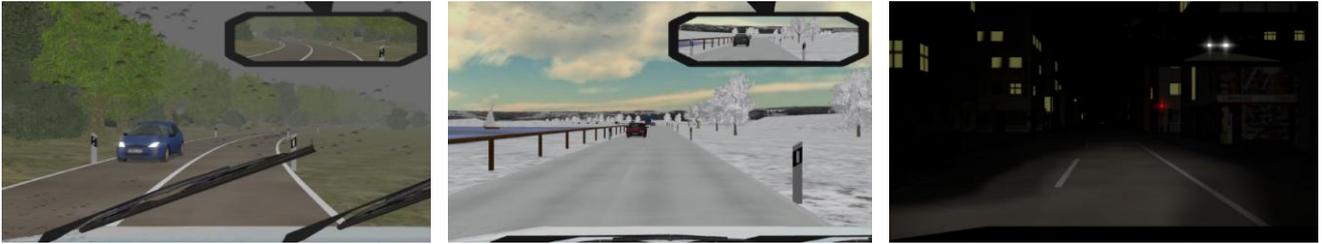
2.5.5. Mountains

The driver trains driving in the mountains. In particular, he is confronted with serpentines and tunnels.

2.5.6. Combination (rural, urban)

After a ride in rural landscape, the driver enters an urban area. He has to adjust his driving style accordingly.

2.6. Weather and Darkness



2.6.1. Driving in Fog

The drive starts at good sight. Suddenly a fog bank emerges, which requires an adapted speed. Various dangerous situations occur, which, at not adapted driving style, almost unavoidably lead to an accident.

2.6.2. Driving in Rain

The drive is absolved in dense rain. The driver has to cope with bad friction, aquaplaning and bad sight conditions.

2.6.3. Driving in Snow

The road is covered with snow and the friction is extremely bad. The driver has to adapt his driving style to these conditions..

2.6.4. Driving in Winter

The landscape is snow-covered, but the roads are cleared. Occasionally, it might be slippery, though.

2.6.5. Driving at Night

The driver is confronted with the bad sight conditions at night-time. He must correctly switch between high-beam and low-beam light.

Rev. 2015-09-10

Account Card Operation

1. Overview

The optional account card add-on provides or simplifies the following functionalities:

- Allocation of simulator time to users of the simulator(s)
- Simplified user registration at the simulator for usage of personal data like e.g. the educational progress in a curriculum
- Usage of multiple simulators with unified user data

The account cards can be loaded with a variable amount of time, which can be spent on the simulator. When configured in this way, the simulator is only usable with an account card and only if the card contains a remaining time credit.

In addition, the user's personal data is stored on and read from the account card, which obsoletes the manual registration of each driver using the keyboard before each driving lesson. The account cards can be programmed in such a way as a programmed curriculum is started immediately after the simulator is unlocked.

Using special "administrator cards", other driving programs can be started, the simulator can be used without time limit or the simulator can be temporarily unlocked for usage without account cards (using the Options menu).

Please note, that the functions described in this document are meant to be used without a control desk F12CD. The control desk contains means to synchronize the data stored on the control desk and on an account card.

This package contains the following parts:

- Cherry Smartcard Reader USB
- Blank chip-cards
- F12 installation package (contains the Foerst Account Card Dialog software)

2. Installation

The software is installed on the simulator pc in order to use the chip cards and optionally on another office pc in order to program the account cards.

1. Connect the card reader and install driver software: After first connecting the card reader allow the automatic installation of current drivers through Windows Update (you need an internet connection for this to work). This step is not needed on simulator pcs, which have already been delivered with a chip-card reader.
2. On the simulator pc, the necessary software has already been installed together with the F12 software. You can optionally also install the software on an office pc. Use the file Install\B01-AccountCardDialog\Setup.exe contained in the F12 installation package.
3. The simulator software must be configured to use account cards. Use the Configure tool and search for "Require Chip Card" on the "Additional Settings" page. Depending on the configured curriculum, there can be multiple options, which differ in which curricula are started for which programming of an account card. Please read the comments in the text window below the check boxes.

3. Using the Simulator

The simulator can be started just like before, but now it is initially locked and asks for an account card before it can be used.

The driving trainee activates the simulator using his account card. He can then select and complete his training drives. After having finished his exercises, he removes his account card and keeps it until the next training session.

The lesson ends, when the trainee removes his account card. If the time credit contained on it is used up, no new rides can be started¹.

4. Account Card Dialog Software

Using the Account Card Dialog software, an account card can be charged with a time credit or its data contents can be checked or edited.

On the pc used for programming account cards, the software is started and the account card is inserted into the reader. If you use the simulator pc for programming account cards, you must take care that the Account Card Dialog software and the simulation software are never executed at the same time. Otherwise, they will fight for card reader ownership with unpredictable outcome.

¹ Alternatively, the simulator can be configured to immediately lock itself when the time credit is used up. If a scenario is currently running, it is aborted.

The screenshot shows a software window titled "Account Card Properties". It features a standard Windows-style title bar with minimize, maximize, and close buttons. The main area contains several input fields and buttons. The "Serial Number" field is pre-filled with "10000000000001028". Below it is an empty "Extension of:" field. The "Remaining Simulator Time (hh:mm)" field is set to "1:00". Further down are empty fields for "Name:", "Date of Birth:", and "Gender:". The "Curriculum:" field is a dropdown menu. At the bottom is a large "Comment:" text area. On the right side of the window, there are five buttons: "Write to Card", "Refresh from Card", "Reset All Progress", "Format Card(s)...", and "Exit".

The window contains information concerning the account card:

- The serial number, which uniquely identifies the trainee.
- The number of remaining minutes of time credit
- The name and optionally further personal data of the trainee
- optional: the curriculum to be started immediately after unlocking the simulator. The meaning of the selectable options is as you could read in the comments below the check boxes in the Configure tool.

HINT: Leave the mouse cursor hovering over an edit field. After a few seconds a short help text is displayed.

If you change the contents of some editable field, you must press the button "Write to Card" in order to write the changes or you can press "Refresh from Card" in order to reset all fields to the values on the account card.

Please note: During the write procedure, the otherwise green led blinks red. During this time, the account card should not be removed from the reader.

The button "Reset All Progress" erases all data written to the account card by scenarios. In particular, all education progress in curricula is reset.

A fresh chip card must first be formatted in order to be used as an account card. To this end, the button "Format Card(s)..." must be pressed. You can format a chip card as an administrator card by choosing "Format administrator card" from the menu hidden behind the Foerst logo.

In both cases, an already inserted fresh chip card is immediately formatted. If the inserted chip card already contains data, you must first confirm your intention.

On first use, you are prompted to enter a number range for serial numbers. This range is important, if you want to format cards on different pcs. In this case, you have to enter sensible, not overlapping number ranges. For the simple use from a single pc we recommend the range "1-2000000".

After the formatting procedure, the tool allows formatting further cards by simply inserting them. When you are ready with formatting, press "Exit".

Please note: By formatting a chip card, you create an account card with a new serial number, which has not been assigned to any trainee. All old personal data associated with the old serial number on the account card is deleted.

Administrator cards are always formatted with infinite time credit. The default for other cards can be adjusted using "Settings..." from the menu hidden behind the logo.

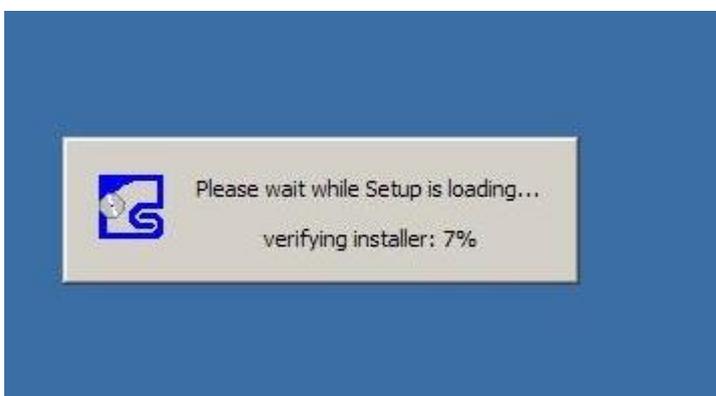
09.07.2009

Driving Simulator F12

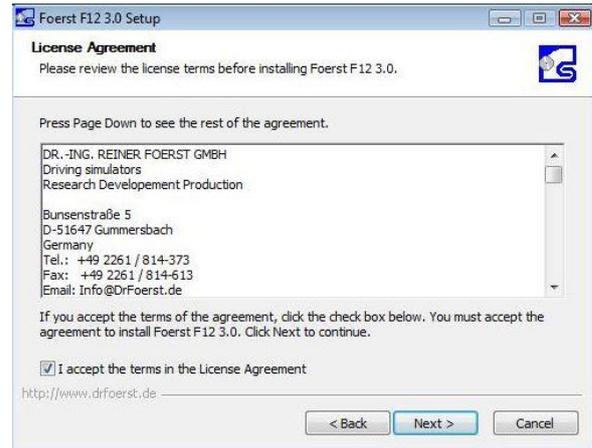
Software Update Procedure

To install a software update, please follow these steps:

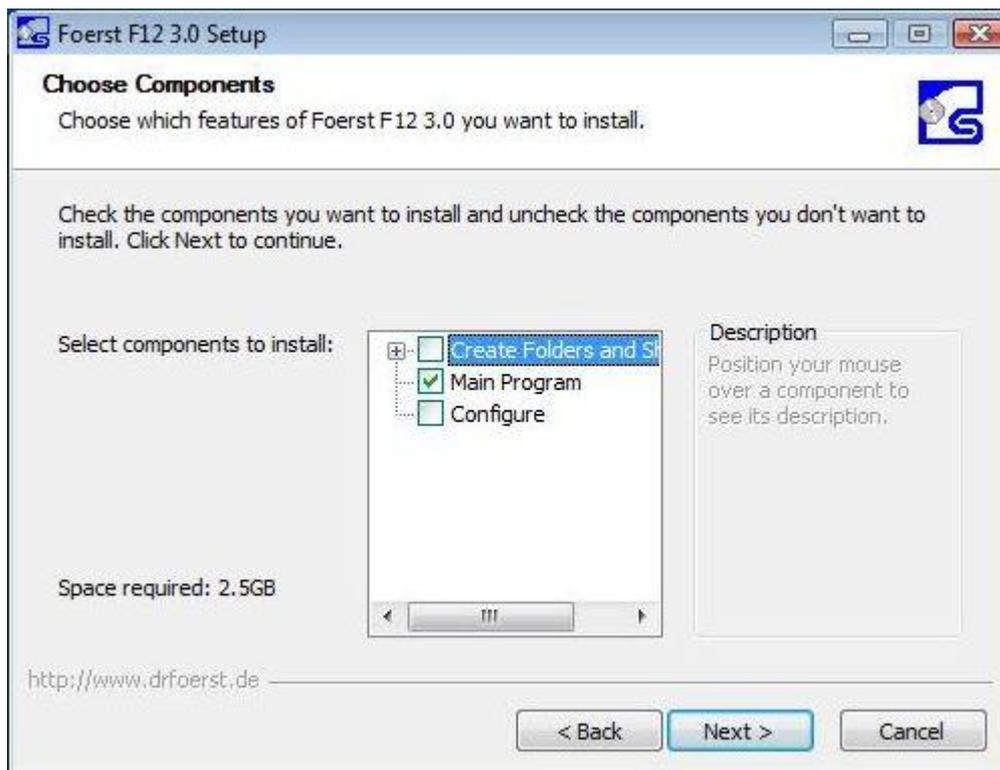
- 1.) Start up the simulator and wait, until the start-up procedure has completed. Please take the keyboard and the mouse connected to the simulation pc and sit down in front of the monitor(s) or projection screen(s).
- 2.) Now exit the simulation program: Use the control unit, enter the "Service" menu and select "Finish without Shutdown". Please wait, until the Windows desktop is visible on all screens.
- 3.) Exit the "Virtpanel" program (dashboard). To this end, select the icon "Virtpanel" in the Windows task bar and press <Alt>+<F4>.
- 4.) Insert the Update CD in the CD rom drive of the simulation computer and start the setup program. Usually, the setup program starts automatically after inserting the CD and closing the drive lid. If the setup process does not start automatically, you have to start it manually: Open "My Computer" on the desktop, navigate to the CD rom drive and start "Install.exe" with a double click on the corresponding icon.
- 5.) The following dialog appears:



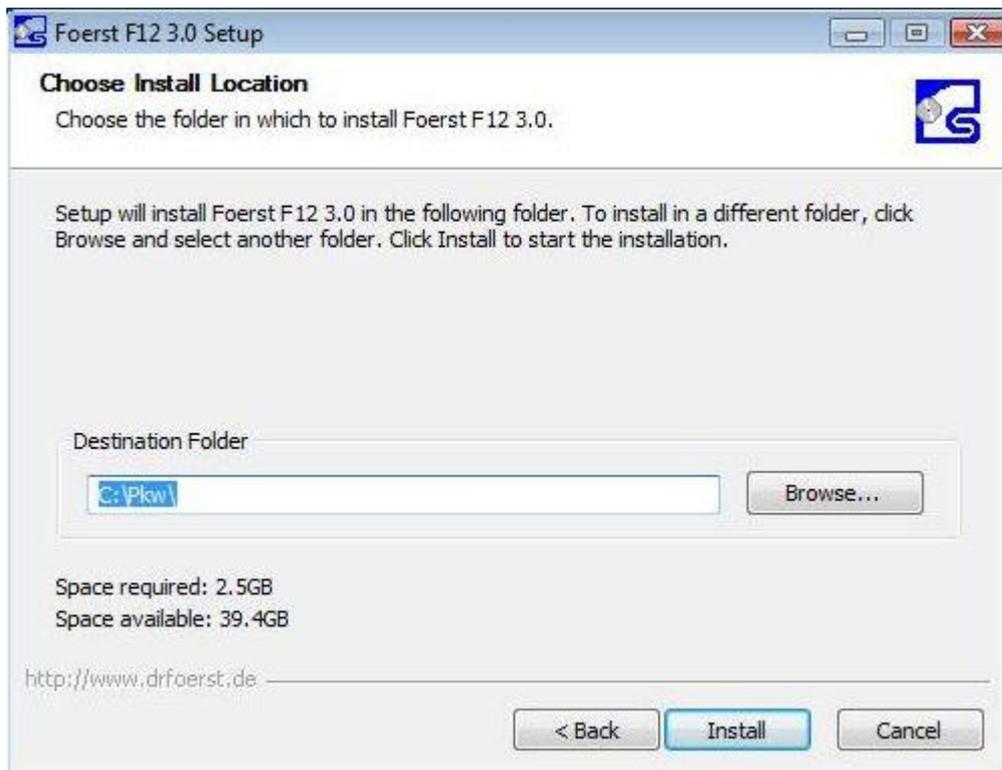
- 6.) After the integrity self test, the setup program starts with the following dialog. Click "Next", accept the license agreement and again click "Next".



- 7.) In the following wizard page, deactivate all items except “Main Program” and proceed with “Next”.



- 8.) Now choose the target folder. Usually, you should not have to modify the default “C:\Pkw”. Start the update process by selecting “Install”.



- 9.) After the installation process, click "Finish" to exit the setup program and restart the pc.



If you have any questions, please don't hesitate to ring us up.

17.12.2014

Assembly Instructions for the Sight System F3/Lxx

Aufbauanleitung für das Sichtsystem F3/Lxx

(1)



(2)



2

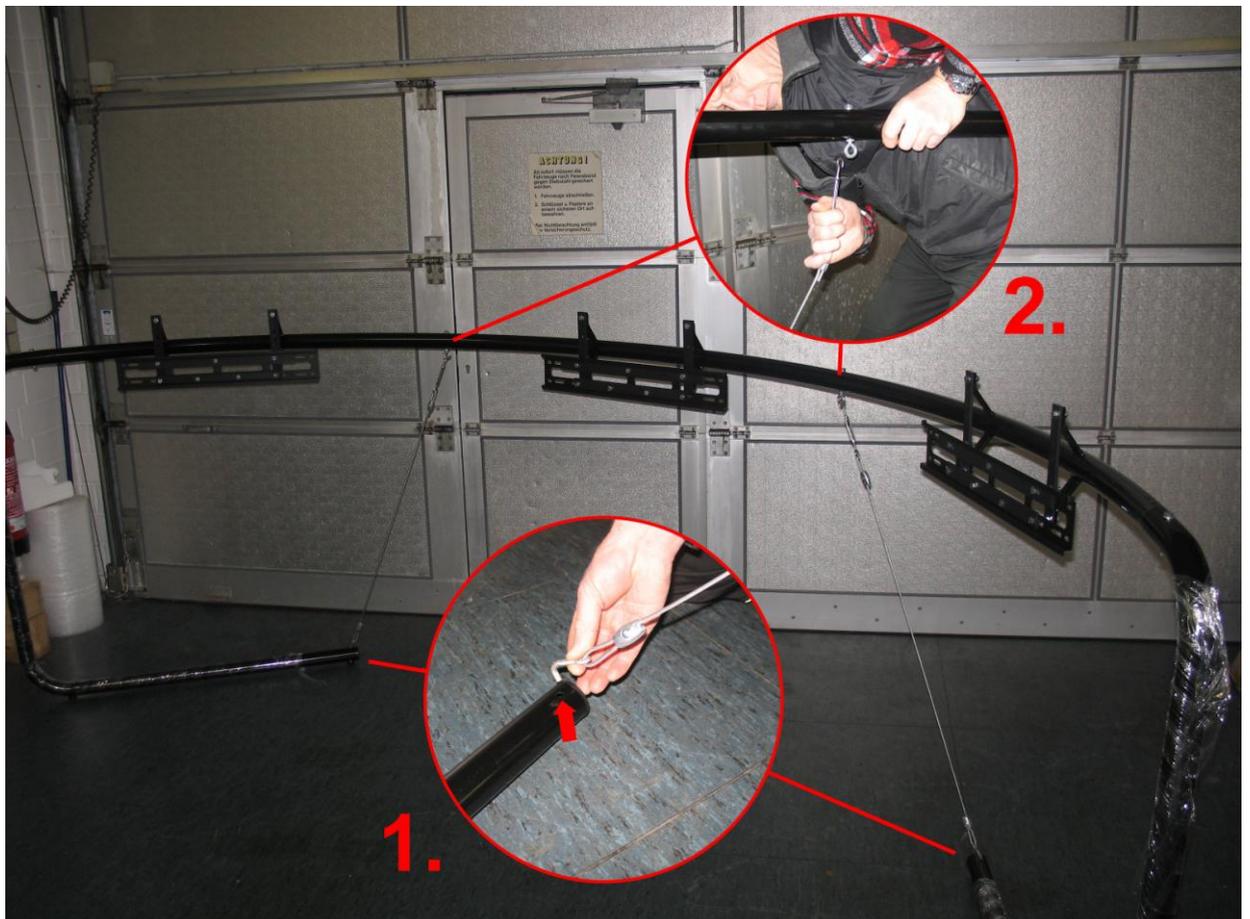
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(4)



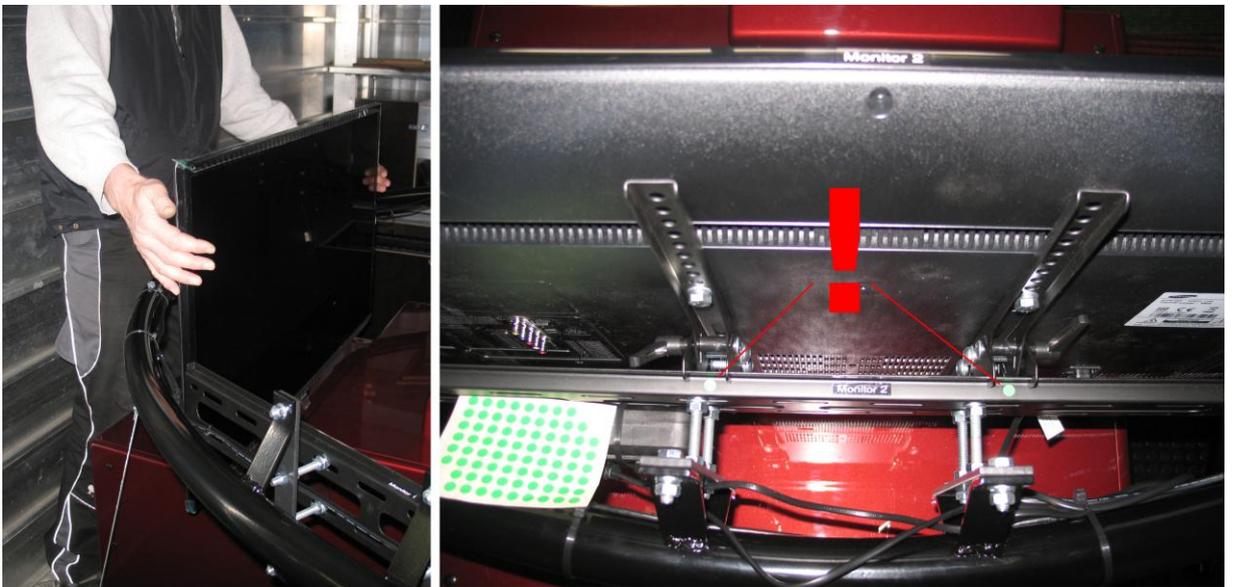
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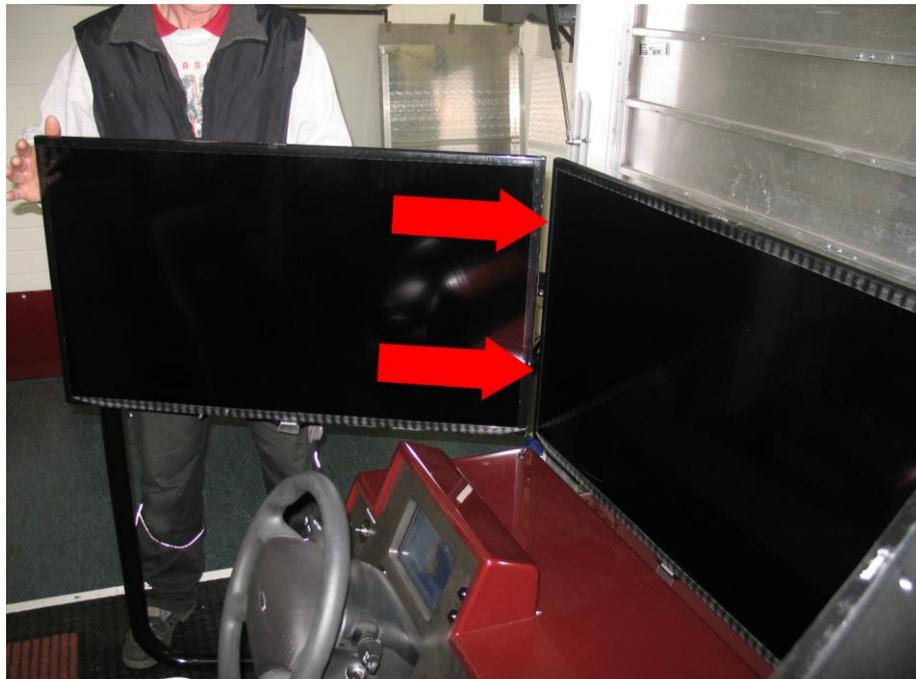
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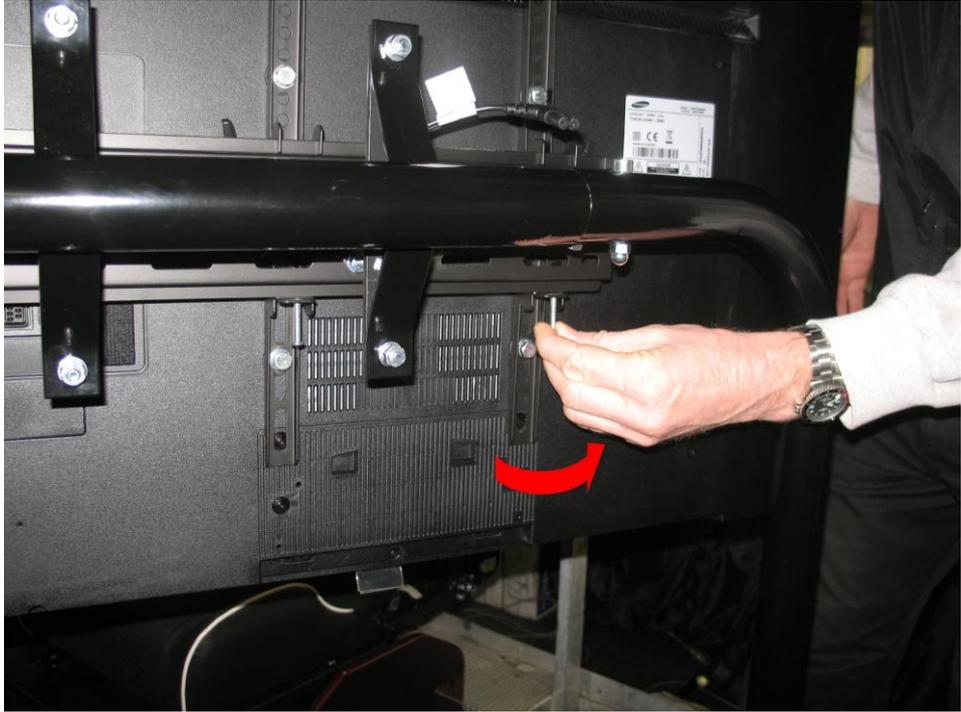


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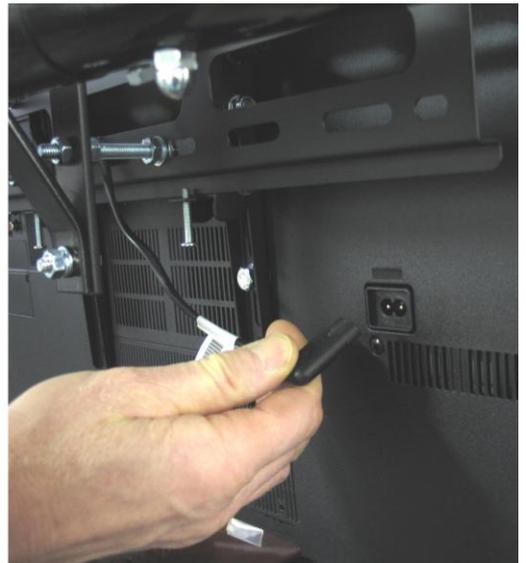


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(10)



4.3.2016

Assembly of the Kinect Sensor

The Kinect sensor is attached to the aluminium sensor support using a single attachment screw. The support is located at the top of the centre screen's rear side.



Fig.1: Rear view of the sensor support. The transportation lock nut must be removed before mounting the sensor.



Fig.2: Rear view of the fitted Kinect sensor.

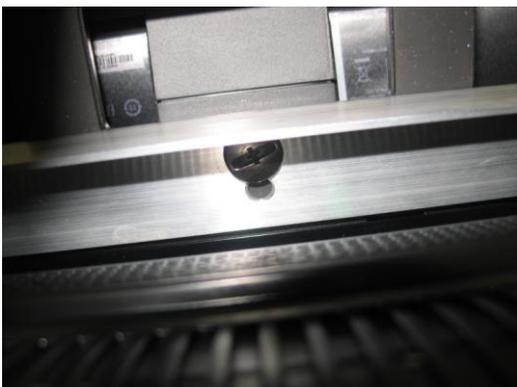


Fig.3: Bottom view of the sensor support and the attachment screw. Use either a flathead or a Phillips screwdriver for fastening.



Fig.4: Front view of the mounted sensor.

The sensor's connector cable must be plugged into the small black box located on top of the simulator cabin (together with the monitor signal cables).

After mounting the sensor, its elevation must be adjusted. To this end use the menu to activate the diagnosis view (c.f. "Using the Menu of Passenger Car Simulators F12P", section 2.1). The right screen now shows the sensor's video signal. The elevation must be adjusted such that an average sized driver's head is located in the image centre.

