

Major Components of the Driver Training Simulator

Simulator should be comprised of the following major hardware components:

- Student Training Station (Cab)

The cab should be fabricated using materials that are representative of an actual fire truck vehicle. Ergonomics and “dashboard” materials will be used to maximize authenticity. The vehicle cab should be a self-contained unit, manufactured from the seller’s standard products and comprises a seat, dashboard with analog instruments and switches, authentic steering wheel and column providing feed-back feel forces, and pedal cluster.

- Vehicle/Simulation Computer Platform
- Image Generators
- Visual Display System
- Aural Cue (Sound) System
- Instructor Operator Station (IOS)

The simulator should be delivered with all the necessary hardware, software and cabling to operate as a standalone unit.

The application software should include a library of emergency vehicle models. Additional vehicle models can be added, at the time of build, with minimal impact on system design. Vehicle dynamics models and virtual world environmental parameters should be selectable at the Instructor Operator Station (IOS) during exercise set-up. Dynamic control of the simulation should be via the IOS or an optional wireless hand-held remote control keypad.

The Fire Truck DTS should be configured with the following additional components:

- CAMS 3-DOF motion system
- UPS/Power Sequencing Units
- Curriculum Training Package
- FAAC Library Vehicle Models
- Scenario Toolbox™ Authoring Software
- After Action Scenario Review (AASR)
- Auxiliary Instructor Driving Station
- Manned-Tiller Module
- Extended Warranties
- Custom Vehicle Models

- Virtual Instructor Trainee Assessment and Learning System (VITALS) Tool
- Remote Support

Simulators should be configured with remote support capabilities. Remote support allows for a service team to diagnose and correct problems that may arise. In order to enable remote support the Buyer must provide an internet connection to the IOS computer. This connection may either be a wired Ethernet or wireless internet connection or, in the case of a mobile site, a cellular based internet connection. These connections are not required to be connected for the simulator to operate and can be disconnected during normal operation.

Floor Pedals

Floor pedal will be actual or similar components to a real vehicle. Pedals will be positioned/offset in the appropriate orientation as they are in an actual vehicle.

Brake Pedal Forces

Braking forces will be simulated and in accordance with the real vehicle. Braking efficiency will also be realistic and in accordance with the road conditions. ABS effects are simulated.

Steering Wheel/Column

An authentic steering column and steering wheel should be provided and will include the following components and functions as listed – turn signal lever & horn

Steering Forces

Steering feel forces should be accurately reproduced through Force Feedback steering system. This provides resistive, kickback and centering forces (camber recovery) in the steering. The steering forces will respond to road conditions (surface type), state-of-repair and weather conditions. Steering feel forces and travels (stop to stop) will be representative of the vehicle type being simulated.

Driver's Seat

The Driver's Seat should be a replica of the vehicle being simulated. The seat is fully adjustable as is in the real vehicle and has an operational three-point seatbelt.

Seat Belt

A three-point seat belt, colored RED, will be provided.

Seat Belt Clasp Indication

The seat belt clip has a switch built in to detect whether the seat belt has been fastened or not. This is used for scoring purposes. The Seat Belt will include indication at the IOS.

Dashboard Instrument Panel Functionality

The dashboard instrument panel will utilize instruments, switches and/or controls in keeping with the actual vehicle type. It will comprise the following analog instrumentation and switches which will function. Gauge read outs will be imperial measurements.

The following components should be included:

Gauges

- a) Speedometer
- b) Trip Meter

- c) Tachometer
- d) Primary/Secondary Air Pressure Gauge
- e) Oil Temperature Gauge
- f) Oil Pressure Gauge
- g) Water Temperature Gauge
- h) Fuel Gauge
- i) 12 Volt Gauge

Indicator Lights

- j) L/R Turn Signal
- k) High Engine Temp
- l) Low Oil Pressure
- m) Low Air Pressure
- n) Jack Knife
- o) Door Comp
- p) Trailer Position (OK/90)
- q) High Beam
- r) Battery
- s) Pump Engaged
- t) Ok to Pump

Controls/Switches

- u) 3 Button ZF style transmission control
- v) Master Power
- w) Ignition/Headlights
- x) Engine Start
- y) Engine Brake
- z) PTO for engine pump
- aa) PTT for radio (if radio option)
- bb) Parking Brake

cc) Dash Fan

dd) Mirror Control (joy-stick)

Speed/Compass

Displayed on the visual system should be a speedometer and compass. This display can be turned ON/OFF via IOS control.

Light/Siren Control

The simulator should have installed with a modified Whelen 295 Series Siren Control Center. This control center has a 4 position slide switch to control the vehicle's light bar, as well as 6 push button switches for other vehicle lights and sirens/horns.

The Siren control unit is integrated with the vehicle horn and with the gear selector lever to shut the siren off when the vehicle is placed in Park, i.e. Siren Kill. Audio sounds will be generated by the Aural Cue system as a function of the integrated controls.

Radio/Intercom

A simulated radio unit will be installed on the simulator. This radio has been specially designed to support simulated dispatch capabilities and radio use monitoring capabilities. The radio system also supports using a student headset for scenario sounds.

The radio can also be used as an intercom system between the instructor and the student(s).

Air Circulation

The driving station compartment dashboard incorporates an air circulation vent, similar to a real vehicle being simulated, blowing ambient air.

Headlights

Headlight high and low beams will be simulated and seen in the Visual System. The "High Beam" dashboard indicator will be illuminated.

Rear View Mirrors

The Left/Right Rear-View mirrors are graphically inset into the visual display window to provide virtual mirrors. Upon loading a particular type of vehicle the mirrors will be automatically placed and sized within the visual to be representative of the vehicle. Mirror views will be adjustable by way of the dash mounted joy-stick.

Mirror types include flat and convex. These are typically configured with the convex mirror below the flat mirror. These can be reversed if necessary.

Display System

The Out-The-Window Visual scene provides the view seen outside of the cab window. In the virtual world, the ability to display a true, undistorted visual scene is a factor of two components: the Image Generator scene and the real-world "physical" Field-Of-View - the simulator display system. For a true representation of the "real-world" scene, the Image Generator scene must correlate directly, be geometrically aligned, with the "real-world" direct physical Field-of-View of the display system i.e. a one-for-one overlay without any skewing, slewing or distorting of the virtual image

Display Resolution

The resolution of the image is a combination of the physical screen pixel count and the Computer Generated Imagery (CGI). Each window scene (channel) is should be produced by a dedicated IG. The IG is PC-based processor, which provides a progressive High Definition (HD) image resolution. The CGI is computed and refreshed at a synchronized native rate that provides a seamless and smooth image, free from image splitting (doubling) and flicker.

INSTRUCTOR OPERATOR STATION (IOS)

The Instructor Operator Station (IOS) is a PC-based Graphical User Interface (GUI) that allows the instructor to control the simulation. The IOS will include a Computer/Monitor integrated with a keyboard and mouse. Power should be placed in the vicinity of the IOS.

The GUI has been developed specifically for this purpose, gained from many years of experience in the driver training industry, and in consultation with our customers.

IOS Main Features

The IOS provides the instructor complete control of the simulator. The operator/instructor should have the ability to load the simulation with different options and then control the simulation manually or automatically via scripts and/or Lesson Plans.

Scripted Scenarios/Locations/Lesson Plans

Under the main IOS window the instructor should be able to load the specific Scripted Scenario and Location (virtual world) that the instructor wants the student to experience. The instructor should also able to create lesson plans from a list of scripted scenarios. Lesson plans can be compiled by the end-user to aid in the execution of training. By creating lesson plans the instructors can be assured that they are covering all the teaching elements that need to be for that training syllabus. This also assists the instructor in streamlining the training. Multiple and unique lesson plans should be created and saved on the system.

The software should also offer a place for student critique and a record data base.