Tank Gauge System Simulator

Version 1.09

User Guide

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1 Preface

The Doms Tank Gauge System Simulator (TGSSim) is a program, which can be used to simulate different tank gauge systems. The TGSSim may not support the whole protocol of a specific system, but only the parts used when running with a Doms PSS 2000, PSS 3000 or PSS 5000 system.

The Doms TGSSim is capable of simulating up to 18 different tanks in a tank gauge system, each communicating by means of the same protocol. The active tank gauge protocol and the tank data can be changed on the run as described later in this manual.

1.1 Hardware Requirements

To run the TGSSim program you have to use an IBM PC or fully compatible, with at least:

- 1 COM port
- 1 floppy or harddisk.
- EGA-card or better

If the PC is equipped with a CGA-card, the program will still work, but the user interface will be poor.

1.2 Hardware Connection

When using the TGSSim in connection with the PSS system, the connection must be done using a RS-2323 module as shown below:

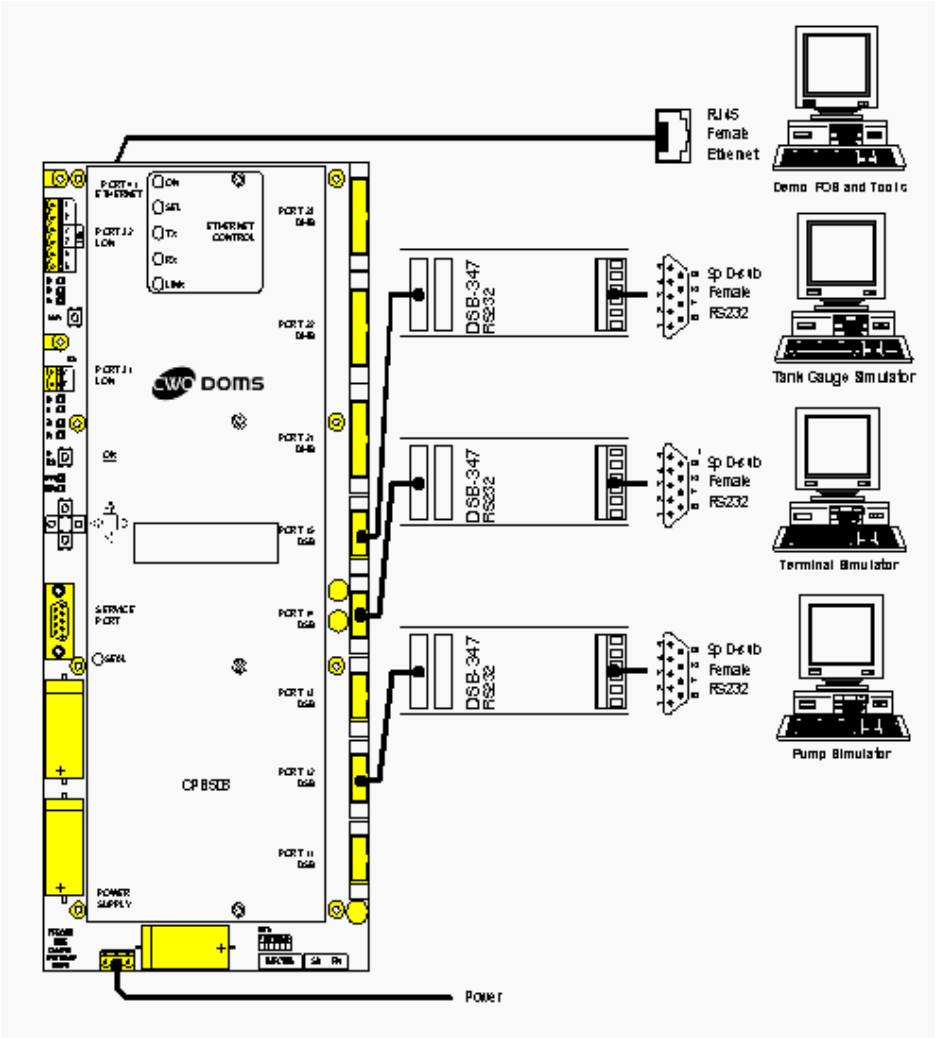

Fig. 1 Connecting TGSSim to the PSS 5000 System

Depending on the Forecourt program version and set up, the port to be used might be another one than the one shown in the figure. The simulator can use the following protocols.

- “CMS 3000" Protocol, also known as the "B Ctrl A" protocol.
- “4Tech” Protocol.
- Veeder Root.

1.3 Starting TGSSim

The Doms tank gauge system simulator is started from the DOS prompt by entering:

TGSSIM.EXE

and then pressing the **[Enter]** key. The file pumps.xml has to be available or the tank gauge simulator will not start. A description of the file can be found in chapter "Reconciliation"

The full syntax of starting the TGSSim is as follows:

TGSSIM.EXE [/Nn] [/D] [/P] [/Ln /Af] /[/?]

where the command line switch

/Nn	use COM port no n (n=1...2).
/D	Create a communication dump file. (*.dmp)
/P	display all the available tank gauges protocols.
/Ln	Enables auto delivery, when tank volume is below n
/Af	Auto delivery fill type f =: r: Random volume, in whole 100L m: Fill the tank to the max number: Always deliver this amount.
/?	Display a short help screen.

2 TGSSim user Interface

The TGSSim user interface consists of three windows:

- Tank data window
- Status window
- Communication log window

Below is shown an example of the TGSSim user interface.

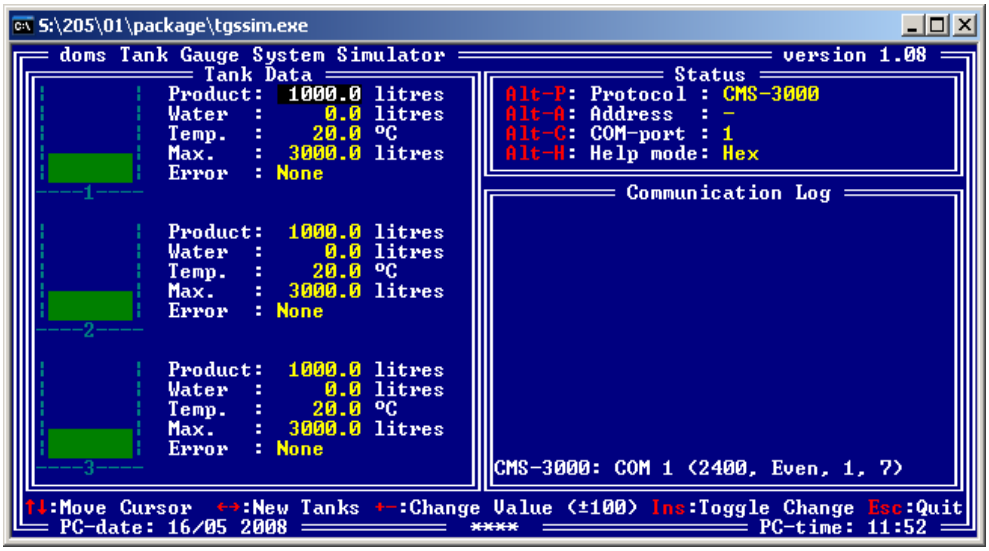

Fig. 2 TGSSim User Interface

2.1 Status Windows

The status window contains general information on the tank gauge system simulator, such as protocol name, protocol address, active COM-port and the active help mode. Each of these items is described in details in the following sections.

2.1.1 Selection of Protocol

It is possible to choose/change the active tank gauge protocol between a numbers of protocols, by pressing **[Alt-P]**. The name of the actual protocol will be displayed in to of the status window.

2.1.2 Selection of Address

A small number of the supported tank gauge protocols support an address. How this address information is being treated will vary from protocol to protocol, why the meaning of the address will not be described any more in this document. The change of address is activated by pressing **[Alt-A]**.

For more information on the address information, consult the protocol description for the selected protocol.

2.1.3 Selection of COM-port

The TGSSim program can be run on both the COM1 and COM2 port on the PC. To toggle the active COM-port press **[Alt-C].**

2.1.4 Selection of Help Mode

The communication log windows are capable of showing two kind of help/log information.

- information in show in hex format (typically protocol messages)
- information in plain text (typically protocol event messages)

As default messages are shown in the communication log windows in hex format, which typically will be messages send and received by the TGSSIM program. What actually will be display will depend of which tank gauge protocol currently selected. In hex mode the messages will be shown in groups of 8 bytes pr line.

To toggle the help mode to ASCII press **[Alt-H]**. In ASCII mode some protocols will display the messages in plain text, others will not display anything. To toggle back to hex mode press **[Alt-H]** again. Notice that the change of help mode is not implemented fully in all the supported protocols.

2.2 Communication Log Window

The communication log window is a window, where information relevant to the selected protocol is displayed. The text/information can either be in hex, ASCII (plain text) and is scrolled over the windows, i.e. when the information reaches the top line of the windows it will disappear. This function is not fully implemented for all the supported protocols.

2.3 Tank Data Window

Below is shown an example of the tank data window:

Fig. 3 TGSSim Tank Data (Volume)

After the program is started the screen will show 3 tanks (tank 1 to 3).

For each tank it is possible to change the following settings:

- Product level/volume
- Water level/volume
- Product temperature
- Tank maximum (height or volume)
- Error-state

As listed above the product, water and capacity can all be displayed as both level data and volume data. What unit is being used is determined by the protocol selected. The resolutions of the units are 1/10 mm and 1/10 litres respectively.

The product level/volume can be anything between zero and the maximum height/capacity of the tank. The product level/volume includes the water level/volume. The product level/volume is either measured in millimetres (mm) or in litres, according to the unit of the chosen protocol. As default the value is set to 1000.0 mm or 1000.0 litres according to the chosen protocol.

The water level/volume can be anything between zero and the product level/volume. As default the value is set to 0.0 mm or 0.0 litres according to the selected protocol.

The product temperature can be anything between -99,9 C and 999,9 C, changing in steps of 1/10 C. Default value is 20.0 C. Some protocols do not supports the range mentioned above so another range is chosen. See relevant protocol description.

The default value for maximum of the tanks will vary from protocol to protocol. Just like the product and water the maximum can be measured in both mm and litres depending of the protocol selected.

The error field contains a number of errors possible of occurring in the selected protocol. As default this value is 'None'. Examples of other errors can be 'water alarm', 'invalid volume', 'no good data, 'malfunction' etc.

2.4 Changing Tank Data

To alter the settings of a tank, move the cursor (the black bar) to the wanted tank using the up- or down-arrow. Use the **[+]**-key to increase the level/volume/temperature and the **[-]**-key to decrease the level/volume/temperature.

At start-up the level/volume/temperature will increase/decrease with one unit each time plus or minus are pressed (i.e. 100.0 litres, 100.0 mm or 100.0 C). Each time the **[Ins]**-key is pressed the step will be decreased by a decade (factor 10). The steps can get the following values '100.0', '10.0', '1.0' and '0.1'. If '0.1' is selected and the **[Ins**]-key is pressed the step will return back to '100.0'.

The **[+]**- or **[-]**-keys will also shift the error-state of the tank gauge. The error displayed is the error reported.

If the system has more than three tanks (maximum is 18 tanks) it is possible to switch between the tanks in set of three by pressing the **[←]**- or **[→]**-key (left and right arrows). This will show the three previous/next tanks. The number of the tanks displayed is shown right below the graphical representation of the tank.

The tanks displayed will, if the PC is equipped with an EGA-card or better, show the contents of the tank in a semi-graphical mode, where the water level is shown as grey dots and the product is shown as a filled grey area.

If the PC has a CGA-card water level will not be shown, and the product-level will be in a much larger steps. But above, the program will function as described.

2.4.1 Deliveries

A delivery is generated if the product volume in the tank is increased. The delivered volume is reported when no increase in volume have occurred for 2 minutes. Each tank has a history of 4 deliveries. Not all protocols support deliveries. See the relevant protocol description.

2.4.2 Reconciliation

For setting up the link between pumps and tank the pumps.xml file have to be altered, see description below. The standard file included links the tanks grade option 1 to tank gauge 1 etc.

The pumps.xml file is an xml formatted file holding the pump – tank configuration. The Doms PSS has an option for a Doms Host Protocol that includes the pump configuration of the PSS. This includes the link between Tank gauges and pumps. Therefore the part of the file containing information about the pumps can be copied into the pumps.xml file.

If the pumps.xml is to be edited by hand the example below can be used as an example.

```
<?xml version=”1.0” ?>
<pumps>
  <device id="1">
    <pump_tots>
      <gropt_tot gropt="1" gr_id="1">
        <tank_consumption tank_id="1"/>
      </gropt_tot>
      <gropt_tot gropt="2" gr_id="2">
        <tank_consumption tank_id="2"/>
      </gropt_tot>
      <gropt_tot gropt="3" gr_id="3">
        <tank_consumption tank_id="3"/>
      </gropt_tot>
      <gropt_tot gropt="4" gr_id="4">
        <tank_consumption tank_id="4"/>
      </gropt_tot>
    </pump_tots>
  </device>
</pumps>
```

Syntax	
Pumps	Tag
device id	Tag to indicate what pump the information is to be used.
pump_tots	Tag
gropt_tot	Tag
Gropt	Grade option
gr_id	Grade Id (not used by tgssim)
tank_consumption	Tag
tank_id	Tank gauge no.

2.5 Keyboard Operations

Keys used in the TGSSim-program:

Key	Function
[Esc]	Quits TGSSim (**[Alt-X]** and **[F9]** will also quit).
[Alt-A]	Changes the address of the tank gauge system (TGS).
[Alt-C]	Switches COM-port on the PC between COM1 and COM2.
[Alt-H]	Switches between clear text and hex-mode in the Communication Log window.
[Alt-P]	Switches between the possible protocols, that the system can simulate.
[←]	Switches to the previous three tanks.
[→]	Switches to the next three tanks.
[↑]	Moves the cursor up.
[↓]	Moves the cursor down.
[+]	Increases the level or temperature, or shifts to the next error. (The error-state will first shift, when the cursor is moved)
[ ]	Decreases the level or temperature, or shifts to the previous error.
[Insert]	Shifts the step size used by **[+]** and **[-]** between the following: 100, 10, 1, and 0.1.

3 History

Date	Rev.	Init.	Comments
1994-12-14	00	STS	First release of document.
1996-06-07	01	STS	Tank capacity added. New display layout. Colour/monochrome switch added.
1997-01-24	02	STS	New command line facilities added. (Tgssim v. 1.04)
1997-01-28	03	JoJ	General text review.
2000-04-14	04	JoJ	Layout updated and general text review. PSS 5000 usage added
2002-08-06	05	JyP/JoJ	New Layout
2004-07-16	06	Agn	Support for deliveries and Reconciliation added (tgssim v 1.06)
2004-10-15	07	Agn	Updated document.
2004-10-18	08	Agn	Updated document for tgssim version 1.07.
2004-12-06	09	Agn/JoJ	Updated document. Minor corrections and with GVR_Doms logo
2005-08-08	09	Mch	Archived with changes made by Agn/Joj 2004-12-06
2008-05-16	10	ToJ	Changed version No in Document title and page header and changed Screen-dump of simulator
2012-07-26	11	MWA	Added command line switches for auto delivery