Intelligent Touch Terminal

(Standalone)

Maintenance Manual

2013-Q1-EN-released-V01

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1 Introduction

1.1 Aims

This document addresses the system administrators in the transport authorities.

It should make it possible for correspondingly trained staff to operate the system efficiently.

1.2 Definitions

The most important terms are explained at the end of the document in the 'Glossary' chapter.

2 Operations Control System LIO

In order to achieve the most important aims of a transport authority, Trapeze Switzerland GmbH has developed the LIO modern control and information system, which satisfies the customer requirements in the following areas:

- Situation-specific operation management with real-time information exchanged between all stationary and mobile system partners using data and voice radio communication.
- Dynamic passenger information in the vehicles and at the stops.
- Import, extension and distribution of the timetable and roster data specific to the compound system.
- Central data management and supply of all system components.
- Statistical analysis, sophisticated reporting and monitoring of the operational data with influence on the planning and data supply.
- Transfer protection and online interfaces.

The LIO system consists of the following components:

- Central **control centre**
- **Data supply**
- Data distribution (depot)
- Reporting / statistics
- Vehicle
- Dynamic passenger information (in the vehicle and at the stop)
- Communication (radio system)
- System interfaces

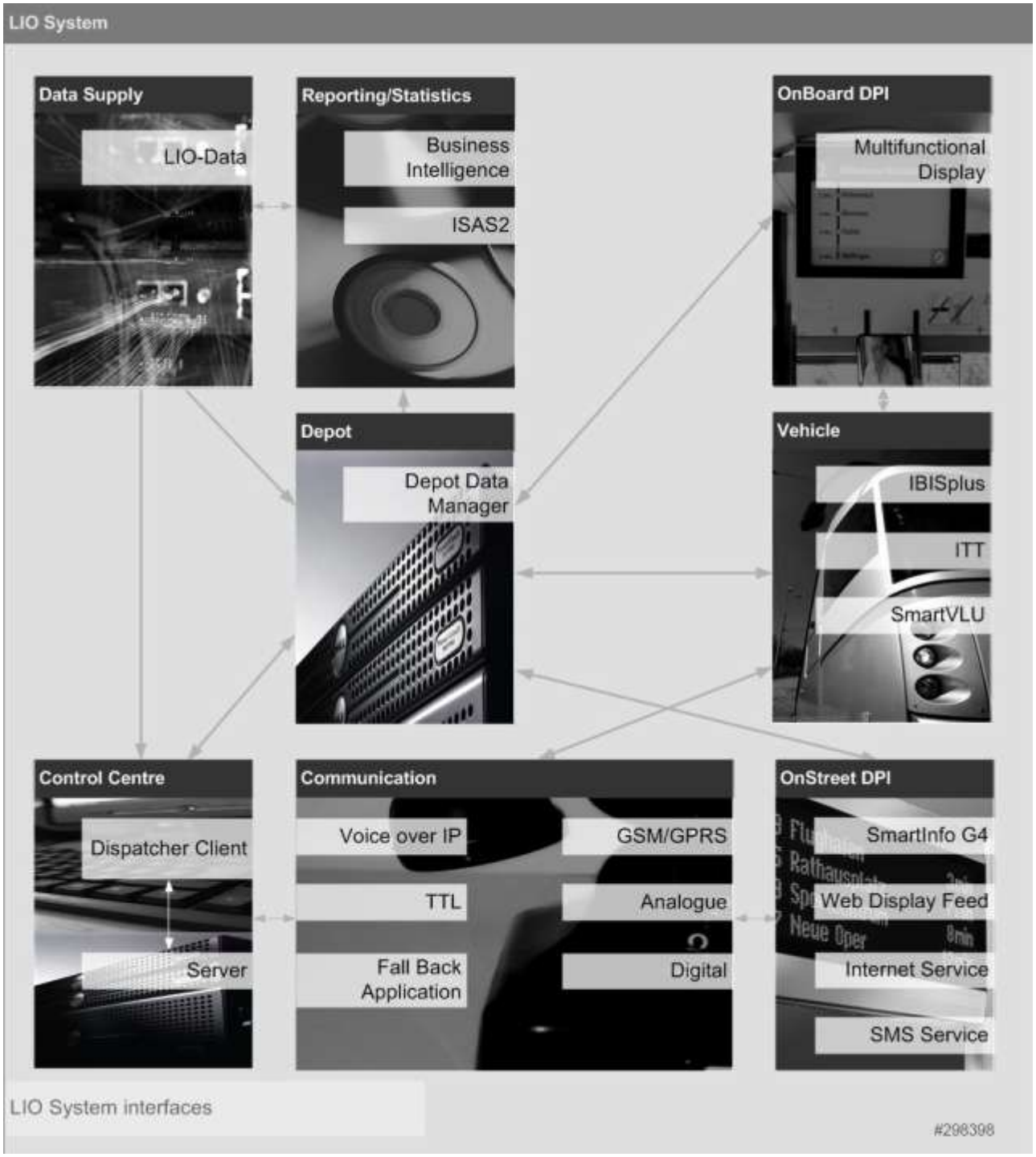


Fig. 1: LIO system overview

A detailed overview of the full LIO system is given in the 'LIO System Description' document.

2.1 Assignment of this document

This document deals with the **IBISplus on-board computer** in the vehicle.

This describes **maintenance and servicing**.

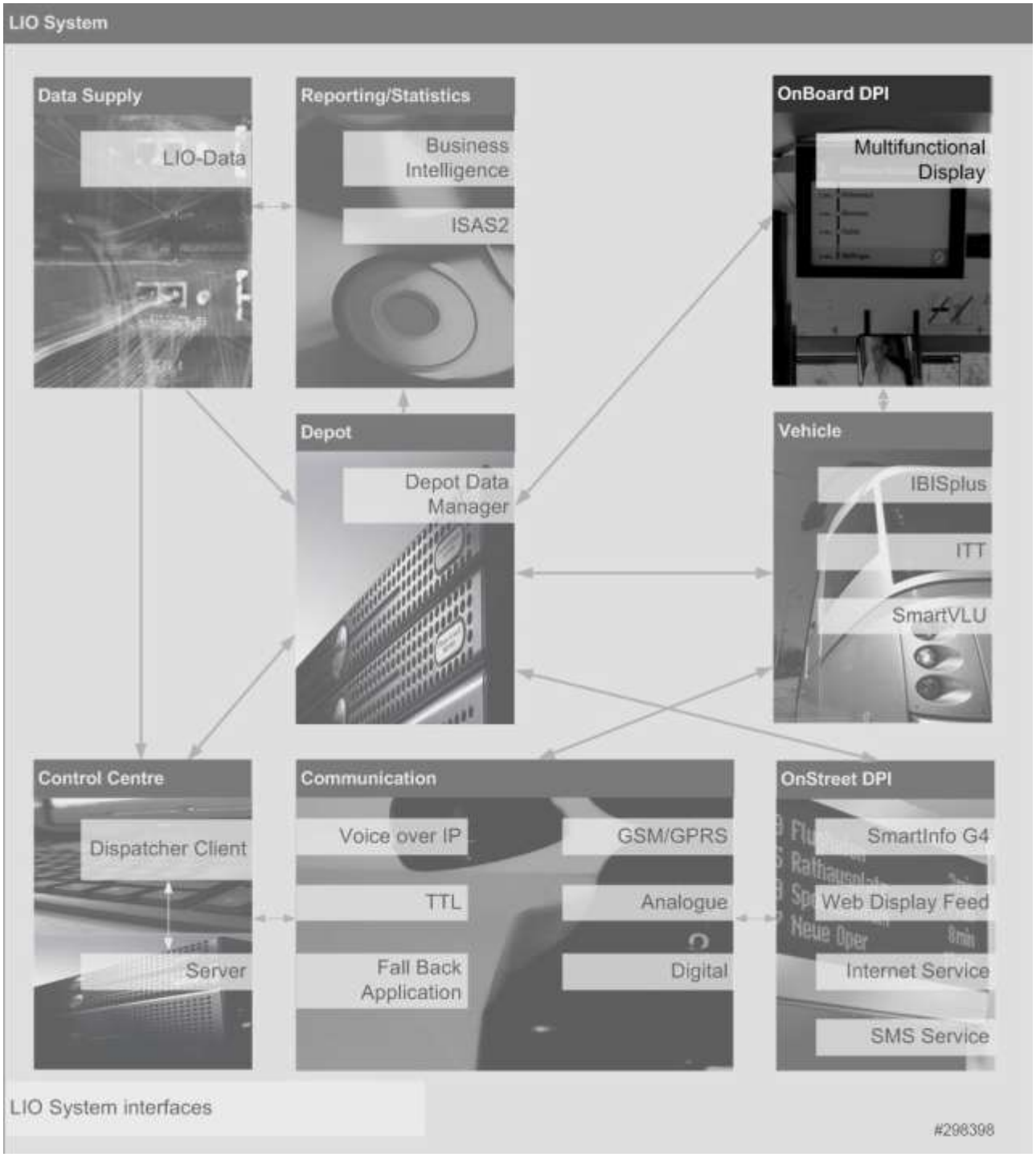


Fig. 2: System Overview, Vehicle Allocation

3 Description

In principle, the ITT consists of just one component that includes the powerful on-board computer and the modern user terminal with 7" touch screen. In addition, the ITT has a large number of interfaces.

3.1 Front and rear view of the ITT

Fig. 3: Front view of the ITT

Fig. 4: Rear view of the ITT

3.1.1 Transfers

Name	Description
LAN	Ethernet interface for web-based service functions and as a connection for the additional components (MFD, GPR, ETM, etc.) (M12)
GPS	Antenna connection for the GPS antenna (SMA)
GSM/UMTS	Antenna connection for the GSM antenna (SMB)
WLAN	Antenna connection for the WLAN antenna (SMC)
HDMI	HDMI output with DVI interface (e.g. connection for MFD slave)
2 x USB	2 x USB 2.0 interface
Mic	Connection of driver microphone (3.5 mm phone connector)
Vehicle criteria	One 44-pole HDSUB connector for all vehicle criteria
Audio	15-pole HDSUB for connection of an external acoustic system

Tab. 1: Transfers

3.1.2 Slots

Name	Description
Micro-SD	Micro-SD slot for storing vehicle data (replacement for EEPROM and backplane)
SIM card	SIM card slot with EJECT button under the cover

Tab. 2: Slots

3.1.2.1 Micro-SD memory card slot at the rear

In the ITT, the micro-SD card is used to replace the backplane used hitherto in the IBIS. It is used to store the vehicle-specific data such as mileage reading and vehicle address. The card needs to be removed only to take the vehicle data over to a new device when the ITT is replaced.

3.1.2.2 SIM card slot at the rear

Prior to commissioning the ITT with UMTS, a SIM card of the desired provider needs to be inserted here. The SIM card must not have a PIN code. After removing the cover, the slot that takes the SIM card can be accessed by pressing the yellow EJECT button.

3.1.3 LED status displays - front-side software-controlled status LED

Colour	Description	Function
Off	ITT is started and the display is on.	The status LED indicates the current system status of the ITT.
Red/green/blue (alternating)	'Powerup' is displayed directly when the device is switched on.	
White (short flashing)	Confirms a valid entered key combination.	
White (permanent)	Indicates that the SPI connection is not yet estab-	

Colour	Description	Function
	lished.	
Green (permanent)	ITT is in failure operation mode due to watchdog or application.	
Green (flashing)	CPU watchdog, device will restart.	
Blue (permanent)	ITT has started but the display is not yet on. (e.g. Driver Present not active)	
Blue (flashing)	With a flashing rate of 100 ms/500 ms, the blue LED indicates a 'sleep request'. If the flashing rate is 100 ms/1,100 ms, the device is in sleep mode.	
Green/blue (alternating)	Combination of green and blue. (Device has started, application does not reset watchdog and display is off.)	
Red (permanent)	Indicates overtemperature.	
Red/blue (alternating)	Overtemperature reached and display off.	

Tab. 3: Status LED

3.2 Operating states

3.2.1 Boot

The ITT is in the 'boot' state when ignition is on and the operating system is starting up but the system has not yet changed to condition 'operational'.

In this phase, the application DLLs are updated if applicable. This only happens after new software has been transmitted from the **Depot Data Manager** DDM. For this reason, this mode usually runs through very quickly.

3.2.2 Operational

The ITT is in the 'operational' state when ignition is on and the ITT was able to start up completely.

3.2.3 Self-holding

The ITT is in the 'self-holding' status if ...

1. ignition is off,

2. a route/run or block number has been entered, and

3. the self-holding time has not yet expired.

The default value for the self-holding function is 1 hour. The self-holding time starts as soon as the driver has switched the ignition off. As a rule, the status is assumed when the driver is taking a break and leaves the vehicle for this purpose. If the driver switches ignition on in this state, the ITT continues to work in the operational range.

3.2.4 Run-out time

The ITT is in the 'run-out time' state if ...

1. the on-board computer was in the 'self-holding' state and the self-holding time has expired, or

2. the driver has executed an operational logoff and switched ignition off (i.e. route-run or block number is zero).

There is no pre-configured value for the run-out time. The run-out time is used to bring certain peripheral devices to a basic status and to proceed with operational, possibly technical log off procedures.

3.2.5 Sleep

When ignition (ignition/battery on) is switched off, the on-board computer is restarted after the run-out time has expired. In the case of active communication with the depot system, the restart is delayed until the data transfer is complete.

The on-board computer then switches to 'sleep' mode. The computer 'wakes up' every 2 hours (can be configured) from this state of reduced power consumption to be able to receive data from the DDM if available.

If ignition or TEIN is switched on, the computer is operational within seconds.

3.2.6 Off

As an alternative to the sleep mode, the ITT may also be shut down completely to save the battery. The consequence however is a longer start-up time. In this state, however, the ITT will not wake up at night to download available data from the DDM.

If the ITT was shut down completely, it can be switched on only by switching ignition on.

4 Commissioning

4.1 Initial clarifications

If the vehicle is a new one, it has to be registered already in the **data supply** in LIO-Data and LIO-Data has to be loaded. (Exterior displays are otherwise not controlled.)

It needs to be determined whether the vehicle is one with an appropriate vehicle-specific configuration file (Configuration<N>.xml) or whether the standard configuration is suitable. (See chapter 'Parameter files (XML) [▶ 21]'.)

If a vehicle-specific configuration is to be used, make a corresponding entry in the CnfGrp.txt file. (See chapter 'Parameter files (XML) [▶ 21]'.)

4.2 Initial commissioning

Initial commissioning generally follows a pre-defined commissioning log. This also defines which peripheral devices are to be tested and how.

4.2.1 Software installation / card partitioning

The ITT is always delivered with a pre-installed OS and initial installation is then made by means of a storage medium configured for the purpose. Please refer to 'New installation (via a configured storage medium) [▶ 25]'.

4.2.1.1 Pre-installing software on the ITT

The ITT is set up in such a way that the software is installed on the vehicle directly upon commissioning. Nevertheless, devices with pre-installed software can be installed.

If this is the case, please note the following:
Certain data is written to the micro SD card of the current ITT during the installation process. Specific mechanisms are in place to ensure this only happens for a new installation and is not repeated. The newly installed ITT therefore assumes that the files need not be transferred again.

If the micro SD card is exchanged between installation in a test environment and the commissioning of the vehicle, the transfer needs to be reactivated.

If adjustments have already been made to any **parameter**, the existing micro SD card should be used.

4.2.2 Inserting a SIM card

The SIM card without PIN belonging to the ITT has to be inserted into the slot provided for the purpose. To do this, the cover needs to be screwed off. The micro SD card must not be removed.

4.2.3 Vehicle address / odometer

Upon start-up, the ITT reads the configuration files in dependence on the vehicle address. It is therefore important after installation of an ITT to first set the vehicle address using the browser **and** to restart the ITT.

(The vehicle address is also used for assigning the destination display types.)

The basic vehicle calibration process is achieved using the odometer parameters. It is necessary to know in advance how many pulses the odometer generates per unit of distance.

How the vehicle address and odometer data are set is described in the 'Setting the vehicle data [▶ 39]' chapter.

4.2.4 Date / time

The ITT can store two data supplies on the SSD. The validity date of the data supply and the system date alone determine which data supply is used.

(For an explanation please refer to chapter 'Which base version does ITT use? [▶ 30]'.)

Setting the system time and date are described under 'Changing the system time [▶ 37]'.

4.2.5 Acoustics level adjustment

Chapter 'Changing acoustics parameters [▶ 41]' describes how to adjust the acoustics.

5 Parameterisation / configuration

In addition to the software version and the data supply from **LIO-Data**, the behaviour of an ITT system is influenced by various factors.

1. Parameters that can be defined with the maintenance browser.
2. Basic configuration using XML configuration files

The parameters are saved in the following places:

Parameter	Location	Comments
Technical vehicle number	Micro-SD	Unique and vehicle-specific. Can only be defined using the Maintenance Tool.
Odometer scaling	Micro-SD	Vehicle-specific
WLAN authentication	SSD	Transport agency-specific
Acoustics settings	Micro-SD	Vehicle-specific, but can be overwritten by the 'default' value
Other parameters	SSD	

Tab. 4: Vehicle parameters

In this way, typical parameters belonging to the vehicle (vehicle number and acoustics parameters) remain on the vehicle by changing the micro SD card.

5.1 Parameter files (XML)

The following section provides a basic description of parameter setting by means of **XML** configuration files (configuration*.xml, configTelnetClient*.xml and configDiscreteIO*.xml, ConfigForGsmGprsDaemon*.xml).

The parameters are saved in .xml format and can be stored globally, platform-specific, customer-specific or for the specific vehicle type.

Files for staged parametrisation:

Configuration groups (CnfGrp.txt)

Global parameters (configuration.xml)

Platform parameters (e.g. configurationG2.xml)

Customised parameters (e.g. configurationDVB.xml)

Vehicle-specific parameters (configurationDVB1.xml)

The configurations are loaded in 4 stages:

1. Global parameters:
In the first step, the standard file configuration.xml is loaded. All global parameters stemming from a software release of the **IBISplus** G1 are set to standard values.

2. Platform parameters:
The platform-specific modified ITT parameters are overwritten by configuratio-nITT.xml.
The platform is defined in CnfGrp.txt as entry 'Platform ITT'. If this entry is missing, the standard IBISplus G1 parameters are valid. This entry must be set for IBISplus G2 or ITT.

3. Customised global parameters:
Customised and modified standard parameters are defined in configurati-onXXX.xml, where XXX is the customer code, e.g. DVB. The customised standard parameter for every DVB vehicle is defined in configurationDVB.xml. The Cnf-Grp.txt file must contain the 'Customer DVB' entry.

4. The technical vehicle number is read from the micro SD card when the ITT is switched on. If an entry for this vehicle number, e.g. '999', is found in the file 'Cnf-Grp.txt', then the corresponding configuration file is read in addition, e.g. configura-tionDVB999, and the previously loaded parameters are overwritten.

The 'OverwriteBehavior' parameter (merge, remove, replace) or nodes, which are defined in the xml files, control the way in which values are overwritten in these 4 stages.

The actual configuration result after these 4 stages can be viewed via the mainte-nance browser (see chapter 'Show / export configuration [▶ 38]').

5.1.1 CnfGrp.txt

This file contains a definition for both customer-specific and ITT platform-specific configuration files:

- Entry Platform ITT: configurationITT is loaded in addition (needs to be defined for the ITT only).
- Entry Customer XXX: configurationXXX is loaded in addition.

Following the declaration of customer and platform, this file assigns the vehicles to a configuration group. It consists of two columns, separated by a blank. The first column contains the technical vehicle number, the second column contains the configuration group to which the vehicle belongs.

5.1.2 Standard configurations

Configuration.xml

ConfigTelnetClient.xml

ConfigDiscreteIO.xml

ConfigForGsmGprsDaemon.xml

These files contain standard parameters, supplied by the software release. These parameters can be overwritten by platform, customer- or vehicle type-specific parameters.

5.1.3 Platform-specific configuration

This file contains the standard parameters for the Platform ITT supplied by the software release.

ITT specifies the platform configuration which must be defined as 'Platform ITT' in CnfGrp.txt. These parameters can be overwritten by customer- or vehicle type-specific parameters.

5.1.4 Customer-specific configurations

ConfigurationXXX.xml

ConfigTelnetClientXXX.xml

ConfigDiscreteIOXXX.xml

ConfigForGsmGprsDaemonXXX.xml

These files specify the customised configurations, whereby XXX is the customer code that has been defined in CnfGrp.txt. This group contains all modified parameters, which are valid for all the vehicles of a particular customer.

These parameters can be overwritten by vehicle type-specific parameters.

5.1.5 Configuration group specific configurations

ConfigurationXXX<N>.xml

ConfigTelnetClientXXX<N>.xml

ConfigDiscreteIOXXX<N>.xml

ConfigForGsmGprsDaemonXXX<N>.xml

The number <N> specifies the configuration group and XXX is the customer code that has been defined in CnfGrp.txt. This group contains all parameters that have been defined for vehicles with the same configuration group.

5.1.6 Archive

All configuration files are stored on the internal SSD in directory \\192.168.10.2\d$\Programs\ecu\Config\.

5.2 Changing configuration parameters

When the need arises to modify configuration parameters (XML) and the CnfGrp.txt file, the recommended procedure is the following:

Stipulate what has to be changed and inform the manufacturer.

These parameters are then adapted wherever necessary and made available for the next distribution with DDM.

This procedure offers the following advantages:

The configuration files are stored with the manufacturer so that they can be taken into consideration for future updates.

If several configurations exist, the files to be modified can be updated in all necessary files.

The error risk is minimum when processing xml files.

5.3 Other parameters

In addition to the parameters mentioned above, there are some other parameters which, however, are not defined by the XML files but by means of the maintenance browser (see chapter 'ITT website [▶ 35]').

6 Maintenance

6.1 Data management

6.1.1 What is 'data'?

In this case, data refers both to the data registered in the LIO-Data and also to the actual programmes of the devices and their configuration files. They are downloaded to the ITT.

Data recorded in the vehicle, such as statistics and protocol files, can be uploaded from the vehicle.

6.1.2 Providing the data

Files are compressed for transport and installation on an ITT. The file format MS Cabinet is used for this. (The cabinet file also defines the paths where the files are to be unzipped. A cabinet file can be viewed and extracted with WinZip.)

New software is provided by the manufacturer in cabinet files.

Vehicle data is provided by LIO-Data directly in the form of a Cabinet file.

6.1.3 New installation (via a configured storage medium)

The internal SSD is re-formatted and partitioned prior to new installation. This can only be achieved using a configured memory medium.

The device number (device ID) is irrelevant here and installation always works irrespective of whether an ITT Standalone (controller) or an ITT Viewer is installed.

Please note:

A configured storage medium can either contain the software / system environment for a controller or for a viewer. It is therefore necessary to ensure that the correct software is loaded to the relevant device.

Procedure

The configured storage medium (USB stick) required for new installation is provided by the manufacturer. The configured storage medium contains the folders

'_ITTApps' and '_-ITTData' where the customer-specific application and the data in unpacked condition can be stored.

When handling the USB stick, ensure that it is separated safely from the PC after the updating of the folders '_ITTApps' and '_-ITTData'.

Important: The installation medium provided by the manufacturer cannot be copied!

The USB stick is connected to the ITT together with a keyboard.

The display has to have been switched on manually. (If this is not the case, you need to manually switch it off and then on again. The key combination for manual switching the display on/off is 'F4 – F2 – F3 – F2'.)

The ITT has to be restarted. There are two options for this:

1. Open the 'Command window' (with Windows key + R ⇒ CMD) and enter the reboot command 'shutdown –r –f –t 0'.
2. Disconnect the power supply and wait until all LEDs are dark. Then reconnect the power supply. **Important: This variant must be used only if variant 1 is not possible!**

Keep the 'DEL' key pressed during starting to enter the BIOS.

In the BIOS, the USB stick should be listed as a boot option at 'Save & Exit' (bottom left) in addition to the SSD and the system is then booted from the USB stick.

Please note: When selecting the USB stick, make sure not to select the 'UEFI' variant!

If selection was successful, the ITT will automatically start and execute the installation routine. Then, the watchdog needs to be deactivated while the Windows start screen is displayed! It is deactivated with the key combination 'F4 – F4 – F3 – F2'. The status LED briefly lights white as a confirmation.

At the end (after about 15 minutes), the device restarts and the USB stick can be removed.

The ITT then restarts several times to finalise the installation. The device must remain connected to the power supply during the entire installation process.

The entire installation process may take a good half hour, depending on the functionality range and data volume.

6.1.4 Software and data updates

There are basically two procedures with which the data can be transmitted to the vehicle.

1. Loading with the Depot Data Manager (DDM) via WLAN or GPRS/UMTS
2. Loading with the Mobile Maintenance Suite (MMS)

In each case the cabinet files are stored in a predefined location:

\\192.168.10.2\F$\Download\xx xx depending on device type (e.g. 04 for controller)

After a restart, these cabinet files are unzipped and the content is copied to predefined paths.

If new software has been installed, the computer is restarted again to activate the newly installed software.

6.1.4.1 Transfer via Depot Data Manager (DDM) and WLAN

In the 'operational' mode the vehicle generally tries to create a connection with the DDM via WLAN every 10 seconds. From 'sleep' mode this generally occurs every 2 hours. The times are adjustable.

If successful, the vehicle attempts to load data from the upload directory to the depot server. After this, waiting load jobs are downloaded according to their priority.

When the connection is running, the vehicle logs on repeatedly after a configurable time period. The procedure after logon is the same as that after setting up the connection.

A successful download causes the application loader to reboot the computer at the next opportunity. This is particularly necessary, if the load job was initiated from the sleep mode. It is therefore restarted before reverting to sleep mode. This means that the driver always has the latest data on his computer at logon.

6.1.4.1.1 DDM load job

A load job is configured for the target system on the DDM. This is defined by the 'target device'.

As soon as there is contact between the target system and the DDM, the cabinet files are copied into the target directory. (Exceptions: See chapter 'Routing to peripheral devices [▶ 28]'.)

Next time the ITT starts, the files are unpacked by the installer and copied to the appropriate directories on the SSD.

6.1.4.2 Loading using the Mobile Maintenance Suite (MMS)

Files can be transferred to and from the ITT with the Mobile Maintenance Suite (MMS) maintenance tool. Other devices can also be loaded, e.g. MFDs.

6.1.4.3 Routing to peripheral devices

Files not intended for the ITT are transmitted by means of routing. There are two options:

Intermediate storage in the ITT

A separate sub-directory is created in the download directory for every device. The name corresponds to the device ID of the device:

02 → ITT controller (main head)

04 → ITT viewer (secondary head)

The data to be loaded is stored in the corresponding directory and retrieved by the relevant device. Depending on the type of connection (network or RAS), this transmission may take some time (RAS: approx. 1 hour).

It is also possible to transfer the controller and viewer data in one cabinet file. In the process, the two head-specific cabinet files are packed together in one further cabinet file (cabinet in cabinet) which then first unpacks itself into the appropriate download directories (e.g. \08 for the IDR and \04 for the ITT).

Direct routing via the network

This routing type transmits files that are not intended for the ITT itself.

In the case of peripheral devices with very large data volumes (e.g. Multifunctional Displays or ticket printers), the data is routed directly to the target device and not stored intermediately in the ITT.

For network routing, see also chapter 'Vehicle network [▶ 33]'.

6.1.5 Unpacking Cabinet files

The following files may be located in the download directory (\\192.168.10.2\f$\Download\04):

File name	Meaning
*.cab	Original size **Cabinet file** not unpacked in original size: The file has not yet been processed. **Software and system files** are unpacked only upon restart when the 'valid from' date is reached. **Data supplies** are unzipped after every restart. Chapter 'Which base version does ITT use? [▶ 30] ' describes which **base version** is active. If there is still a *.cab file after the computer has been restarted and although it should not be there, it is necessary to check whether the file has been loaded to the correct directory.
*.cab.ok	File size: 0 KB The file has been processed successfully. This file is deleted after a restart.
*.cab.err *.cab~	Original size An error occurred when writing into the directory.
*.log	The unzipping process is logged in this file. It is deleted in the absence of any errors.

Tab. 5: File extensions of Cabinet files

The cab files are unzipped and installed in the following order:

1. OperationSystem
2. Software
3. Configuration
4. DataSupply
5. MediaData
6. Unknown

6.1.6 Which base version does ITT use?

Data supplies are stored per base version (BV) in a sub-folder in path \\192.168.10.2\e$\Database\. The first 8 characters of the directory name contain the 'valid from' date in the format 'YYYYMMDD'.

To determine the active base version, the current date is compared to the 'valid from' date of the respective base version and the latest, already valid BV is activated.

This means that a maximum of 2 base versions can be loaded: An active BV and a BV that is not yet active.

6.1.7 Loading older base versions

A maximum of two base versions can be stored on the ITT. One current and one with a future validity. If a Cabinet file that contains a data supply is loaded to the ITT, a rule is used to decide which base version is to be deleted: either one of the already existing BVs or the newly transmitted one.

This rule is logical. There is however an application that at first appears illogical, but which is very useful. This is a situation in which the user wishes to load a BV to the vehicle which is older than the currently installed one.
If the user loads an older base version, it replaces the previously loaded BV after the next restart. This in particular also happens if the previously saved BV has a newer 'valid from' date.

7 Troubleshooting & repairs

7.1 Exchanging components

7.1.1 Exchanging the ITT

The ITT must only be exchanged with the power supply disconnected.

The ITT itself does not contain any vehicle-specific parameters. All vehicle-specific parameters (vehicle number, **odometer** * etc.) are stored on the micro SD card. Therefore, the micro SD card has to be taken over from the old ITT to the new ITT.

When using GSM/UMTS, the SIM card needs to be taken over in addition.

To do this, remove the cover at the rear and eject the card by pressing the yellow button.

* **Note:**

The values of the automatic odometer calibration and the mileage data are stored in an internal memory of the ITT. If a device of this kind is installed directly from one vehicle to another, this value is transferred to the micro SD card.

If the device is not without power for a prolonged period, the calibration details and mileage status should be set again after the exchange.

8 Vehicle network

8.1 Concept

Fixed network addresses are assigned in the ITT vehicle network. The address always starts with 192.168.10 and ends with the different addresses depending on device. The table below shows the IP addresses of the devices and the device ID, which is relevant e.g. in connection with the download directory to be used.

Device IP	Device ID	Device
01	01	GPR
02	04	Primary device ITT Standalone
02	02	Primary device IBISplus G1
02	02	Primary device IBISplus G2
04	05	Secondary device Operator ITT
03	03	Secondary device Operator IBISplus G1
03	03	Secondary device Operator IBISplus G2
20	20	Ticket printer
31	31	MFD1
32	32	MFD2
33	33	MFD3
34	34	MFD4

Tab. 6: Device IDs and IPs

In the case of an ITT Standalone, the network routing is handled directly by the ITT. In combination with an IBISplus 19" rack, routing may also be handled by the

IBISplus or a GPR. An official address is visible externally, either WLAN (fixed or dynamic via DHCP) or GPRS/UMTS (DHCP).

Routing from the public network to the individual devices in the private ITT network takes place via NAT (Network Address Translation) and port forwarding.

Network Address Translation: This method allows the devices in the private network of the ITT to communicate with the outside world. The router has the task of converting the network addresses. To the outside world the device is only recognised by its public address; the router transfers the corresponding data from the outside to the correct private address.

Port Forwarding: This method allows members of the public network (e.g. the DDM) to access the individual devices in the private ITT network. Special port addresses are used, which the router then converts for the relevant device and the relevant port in the internal network. These ports are created in the ITT according to a specific rule:

Format: ddppp

Where dd stands for the device ID and ppp for the known port number (default).

Port numbers can also be customized.

Example:

The website is accessed via standard port 80. The controller (main head) of the ITT is accessed with this port. If the user then wishes to open the website of the secondary head (device ID 05), it has to be addressed from the public network via the same IP address but using port 5080 (or 05080). The same goes for FTP (port 20 and 21) and Telnet (port 23). Other ports are defined as required.

For reasons of security this routing is only active before shutdown and during the wake-up period. The routing to a ticket printer is only released for this short period in the depot. However, this printer needs not care whether the connection is established using WLAN or GPRS/UMTS. The selection is made on the basis of defined rules in the ITT and is not visible to the other devices.

9 Maintenance tools

9.1 Communication interface to the ITT

The connection to the maintenance computer is established via an Ethernet patch cable (M12-RJ45).

The ITT can be contacted at the following IP address: http://192.168.10.2

To enable access from a notebook, it must have an IP address in the same network segment, e.g. 192.168.10.**12** (network mask 255.255.255.0).

9.2 ITT website

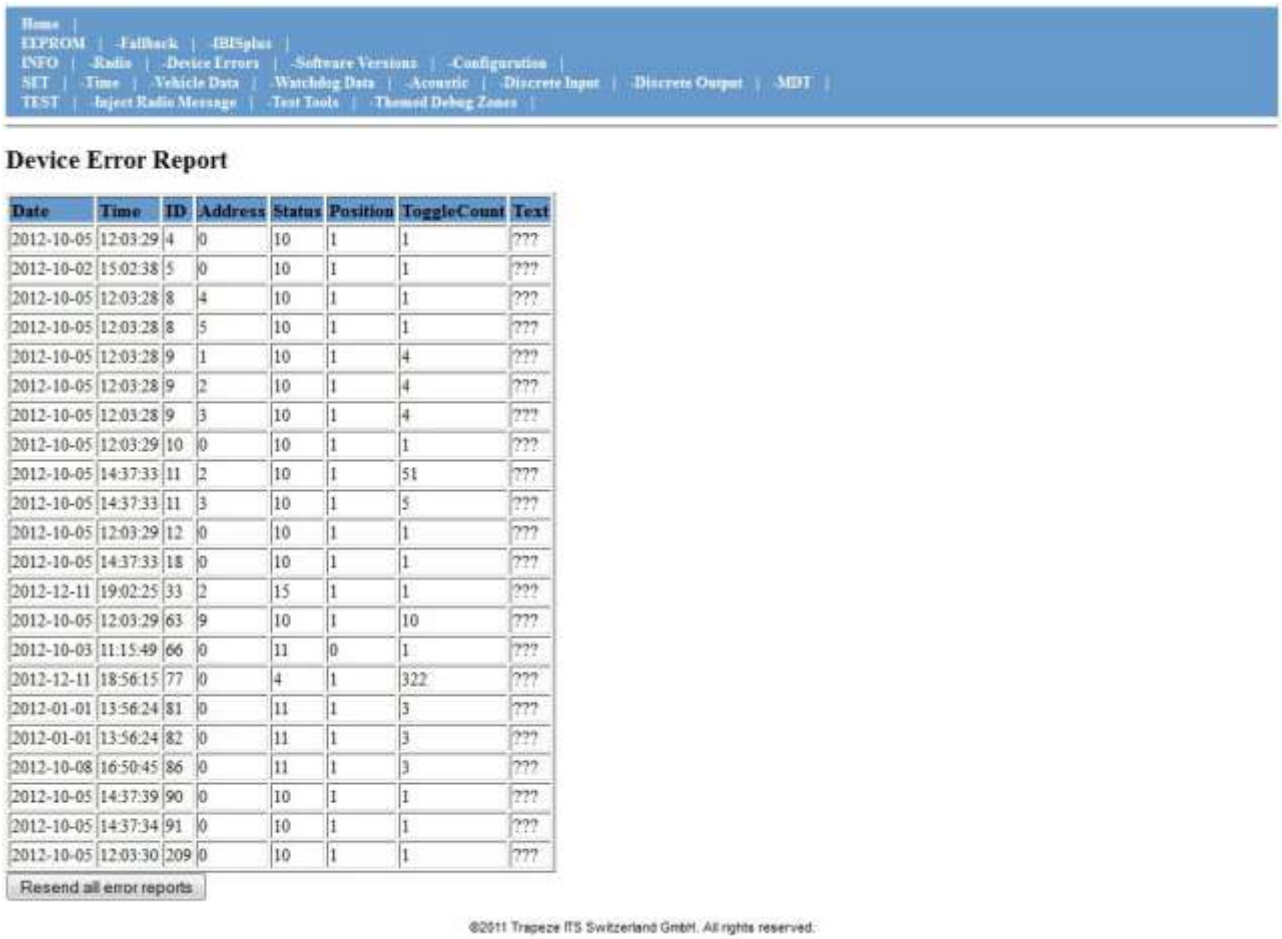
The on-board computer has a website which allows remote access to the vehicle via an internet browser. This can be used, for example, to adjust the time or change parameters.

The homepage can be accessed via http://192.168.10.2.

NOTE! Changes can be made to the system via browser access, which may lead to an unstable condition. Only the recommended parameters should therefore be adjusted.

Fig. 5: IBISplus homepage

9.2.1 Viewing device faults



Home |
EEPROM | Fallback | IBISplus |
INFO | Radio | Device Errors | Software Versions | Configuration |
SET | Time | Vehicle Data | Watchdog Data | Acoustic | Discrete Input | Discrete Output | MDT |
TEST | Inject Radio Message | Test Tools | Themed Debug Zones |

Device Error Report

Date	Time	ID	Address	Status	Position	ToggleCount	Text
2012-10-05	12:03:29	4	0	10	1	1	???
2012-10-02	15:02:38	5	0	10	1	1	???
2012-10-05	12:03:28	8	4	10	1	1	???
2012-10-05	12:03:28	8	5	10	1	1	???
2012-10-05	12:03:28	9	1	10	1	4	???
2012-10-05	12:03:28	9	2	10	1	4	???
2012-10-05	12:03:28	9	3	10	1	4	???
2012-10-05	12:03:29	10	0	10	1	1	???
2012-10-05	14:37:33	11	2	10	1	51	???
2012-10-05	14:37:33	11	3	10	1	5	???
2012-10-05	12:03:29	12	0	10	1	1	???
2012-10-05	14:37:33	18	0	10	1	1	???
2012-12-11	19:02:25	33	2	15	1	1	???
2012-10-05	12:03:29	63	9	10	1	10	???
2012-10-03	11:15:49	66	0	11	0	1	???
2012-12-11	18:56:15	77	0	4	1	322	???
2012-01-01	13:56:24	81	0	11	1	3	???
2012-01-01	13:56:24	82	0	11	1	3	???
2012-10-08	16:50:45	86	0	11	1	3	???
2012-10-05	14:37:39	90	0	10	1	1	???
2012-10-05	14:37:34	91	0	10	1	1	???
2012-10-05	12:03:30	209	0	10	1	1	???

Resend all error reports

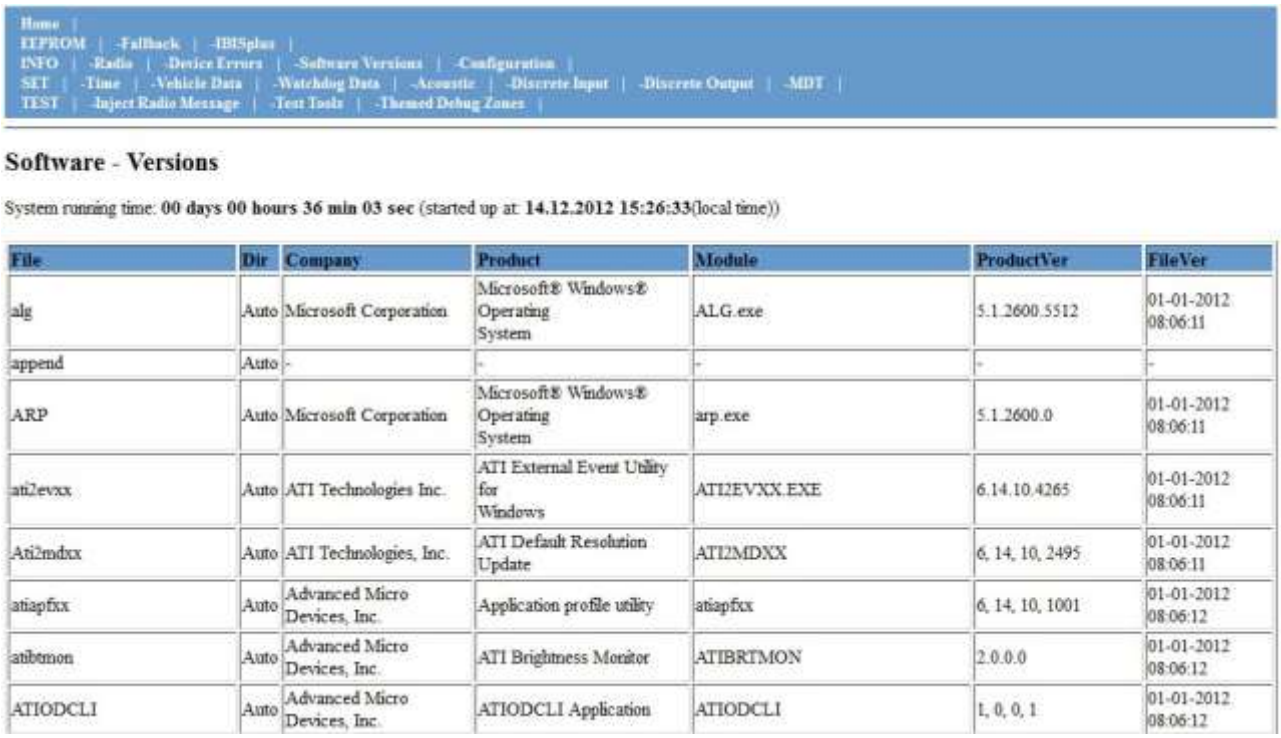
Fig. 6: Device Error Report

This page shows a table of the error messages.

The text in the last column explains the meaning of each error. The value in the column 'ToggleCount' is increased every time an error occurs. It is not possible to reset the counter.

The 'Resend all error reports' button causes all error messages from the ITT to be reprocessed and hence also displays them on the driver display.

9.2.2 Viewing software versions



Home |
EEPROM | -Fallback | -IBISplus |
INFO | -Radio | -Device Errors | -Software Versions | -Configuration |
SET | -Time | -Vehicle Data | -Watchdog Data | -Acoustic | -Discrete Input | -Discrete Output | -MDT |
TEST | -Inject Radio Message | -Test Tools | -Themed Debug Zones |

Software - Versions

System running time: **00 days 00 hours 36 min 03 sec** (started up at: **14.12.2012 15:26:33**(local time))

File	Dir	Company	Product	Module	ProductVer	FileVer
alg	Auto	Microsoft Corporation	Microsoft® Windows® Operating System	ALG.exe	5.1.2600.5512	01-01-2012 08:06:11
append	Auto	-	-	-	-	-
ARP	Auto	Microsoft Corporation	Microsoft® Windows® Operating System	arp.exe	5.1.2600.0	01-01-2012 08:06:11
ati2evxx	Auto	ATI Technologies Inc.	ATI External Event Utility for Windows	ATI2EVXX.EXE	6.14.10.4265	01-01-2012 08:06:11
Ati2mdxx	Auto	ATI Technologies, Inc.	ATI Default Resolution Update	ATI2MDXX	6, 14, 10, 2495	01-01-2012 08:06:11
atiapfxx	Auto	Advanced Micro Devices, Inc.	Application profile utility	atiapfxx	6, 14, 10, 1001	01-01-2012 08:06:12
atibtmon	Auto	Advanced Micro Devices, Inc.	ATI Brightness Monitor	ATIBRTMON	2.0.0.0	01-01-2012 08:06:12
ATIODCLI	Auto	Advanced Micro Devices, Inc.	ATIODCLI Application	ATIODCLI	1, 0, 0, 1	01-01-2012 08:06:12

Fig. 7: Software versions

This table lists the versions of the individual software modules.

Product element	Description
S2BTAMN	IBIS application
S2BTSER	ITT services
S2BTNAV	Navigation software
S2BTMAI	Services maintenance page
S2BTOXP	Operating system XP Embedded

9.2.3 Changing the system time

Fig. 8: Display time

The on-board computer loses the system time, if the power supply remains interrupted for a prolonged period of time. If a radio link is established with the **control centre**, the system time is set via radio. The time can also be set via GPS.

9.2.4 Show / export configuration

Fig. 9: Display configuration

On this page the user can read the configurations with which the computer is currently working (configuration.xml, ConfigDiscreteIO.xml, ConfigForGsmGprDaemon.xml, ConfigTelnetclient.xml).

Please refer to 'Parameter files (XML) [▶ 21]'.

The files can be opened in the browser or saved. It is not possible to change the parameters.

9.2.5 Setting the vehicle data

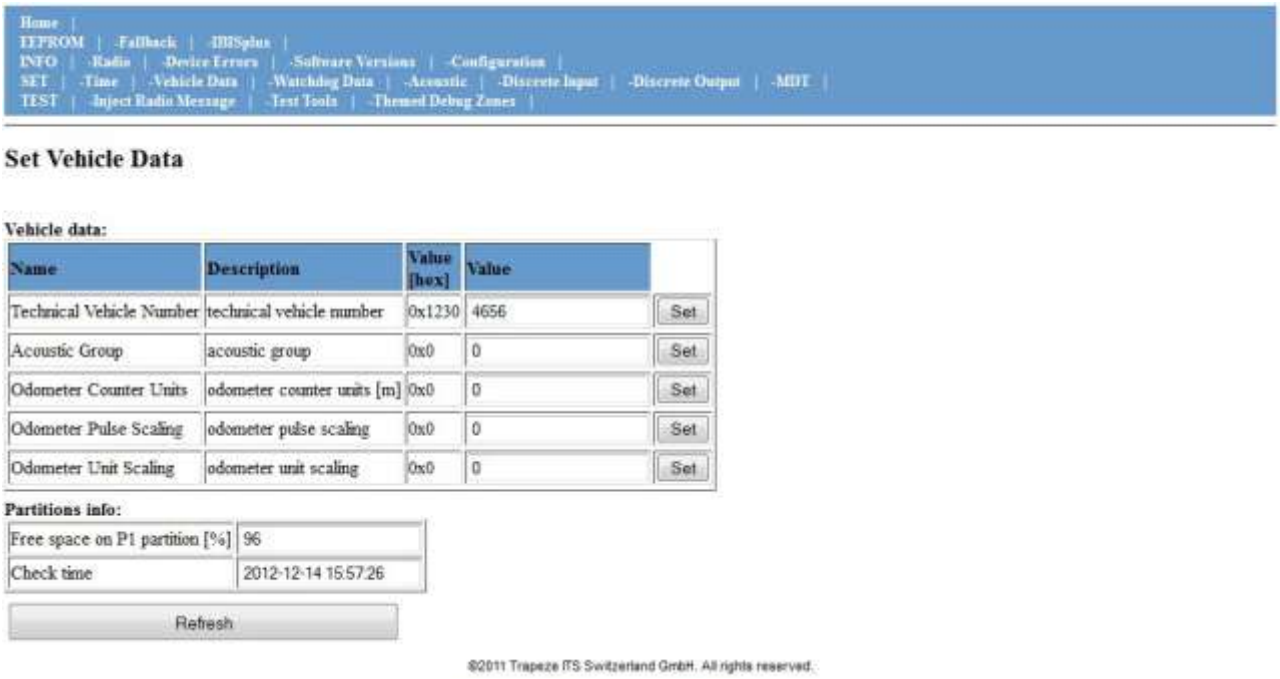


Fig. 10: Set vehicle data

Name	Description
TechnicalVehicleNumber	Technical vehicle number
Acoustic group	Acoustic group to which the vehicle is assigned
OdometerCounterUnit	Current odometer reading in metres
OdometerPulseScaling	No. of pulses per unit of distance (e.g. calibration segment)
OdometerUnitScaling	Distance in metres (e.g. calibration segment)
MilageCounterUnit	Current odometer reading in metres (without correction factor)
MilagePulseScaling	Number of pulses per unit of distance (without correction factor)
MilageUnitScaling	Distance in metres (without correction factor)

Name	Description
Partition info	Represents the available memory for the three partitions (in %).
Daily counter units	Value that is relevant in conjunction with an optional function. This value can be reset by an infra-red beacon during the refuelling process.
Remaining fields	These are not significant for maintenance work

Tab. 7: Description of setting the vehicle data

To ensure adequate odometer accuracy, the calibration factor must be entered as a 4-digit number. The figure above shows the example of an odometer with 4 pulses per metre (or 4000 pulses per 1000 m).

The calibration factor should be defined initially even if the 'Automatic calibration' function is switched on. The algorithm of the automatic calibration function reacts very slowly to large changes in the calibration factor so that it would take too long to obtain the correct calibration factor.

Note:

The on-board computer must be restarted after changing the technical vehicle number.

9.2.6 Changing acoustics parameters

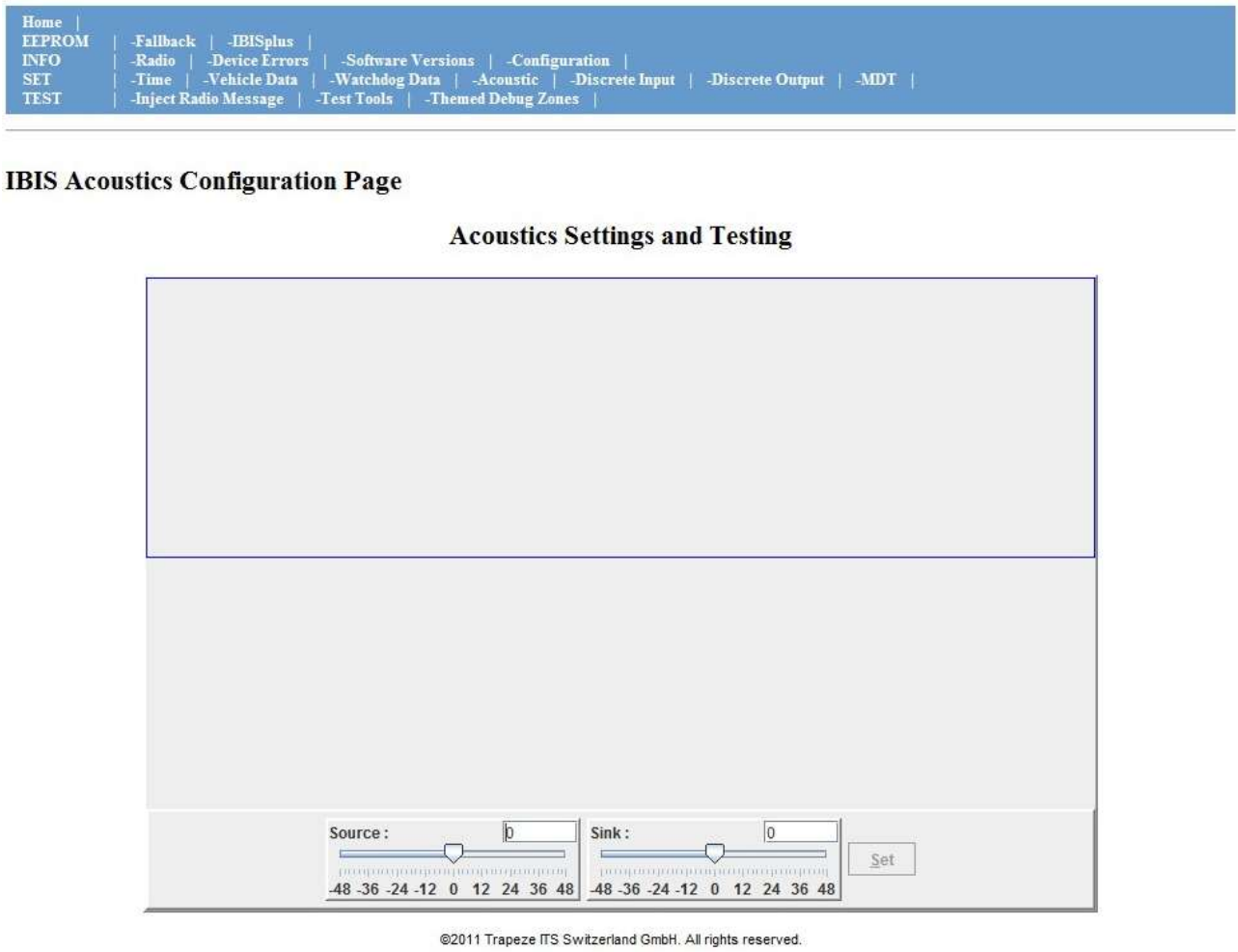


Fig. 11: Audio Gains

The acoustics page consists of two areas:

Upper area

The upper area displays all possible source-sink connections that can be selected by clicking.

Source	Displays all audio sources
Sink	Displays all audio destinations

Lower area

In the lower area, the selected acoustics path can be adjusted easily with the two controllers 'Source' and 'Sink'.

9.2.7 Showing/setting discrete inputs

Fig. 12: Set discrete input

This page shows and simulates the status of the discrete inputs.

In order to establish whether inputs have changed, simply press the 'Refresh' button. The refresh cycle can be entered in the input field to the right of the 'Refresh' button; the permitted value range is 2 to 99,999 seconds. The 'Stop' button deactivates the update service.

As well as checking the physical inputs, the inputs can also be set manually for test purposes.

A logic entry can be simulated via the 'SetTrue' and 'SetFalse' buttons. The 'Reset' button restores the 'hardware status'.

Column	Description
<map> field	This column contains the names of all logic inputs.
<use> field	The logic input (function) is configured.
<SW> field	The value of the logic input (function) is controlled by the master vehicle (in a set of vehicles). This value has the highest priority (priority 1).
<TST> field	Shows the manually entered test value. This value has the second highest priority (priority 2).
<HW> field	Shows the physical value of the input. This value has the lowest priority (priority 3).
<Result> field	Shows the binary status that is valued for the software taking into consideration all switch statuses and priorities.
<SetTrue> button	Pressing the <SetTrue> button sets the test value of the assigned input to 'True'. At the same time (and due to the higher priority) the physical input value (<HW> field) is overruled.

Column	Description
<SetFalse> button	Pressing the <SetFalse> button sets the test value of the assigned input to 'False'. At the same time (and due to the higher priority) the physical input value (<HW> field) is overruled.
<Reset> button	Pressing the <Reset> button revokes all manual actions.
<DataStore> field	If a manual action is effective on an input, the corresponding background colour in the <DataStore> field is violet. The displayed value represents the internal representation of the above statuses.

Tab. 8: Description of Set Discrete Input

The diagram below represents the functionality of the 'set discrete input' mechanism. Under normal conditions the 'HW' input signal (the status of the assigned physical input) is mapped to the 'Result' column. As soon as a person activates a test value (TST), this value is reproduced in 'Result' due to the higher priority. The value of the assigned physical input is meaningless in this situation. If the 'SW' column is then activated in addition, the value of this source is forwarded to 'Result' due to the even higher priority.

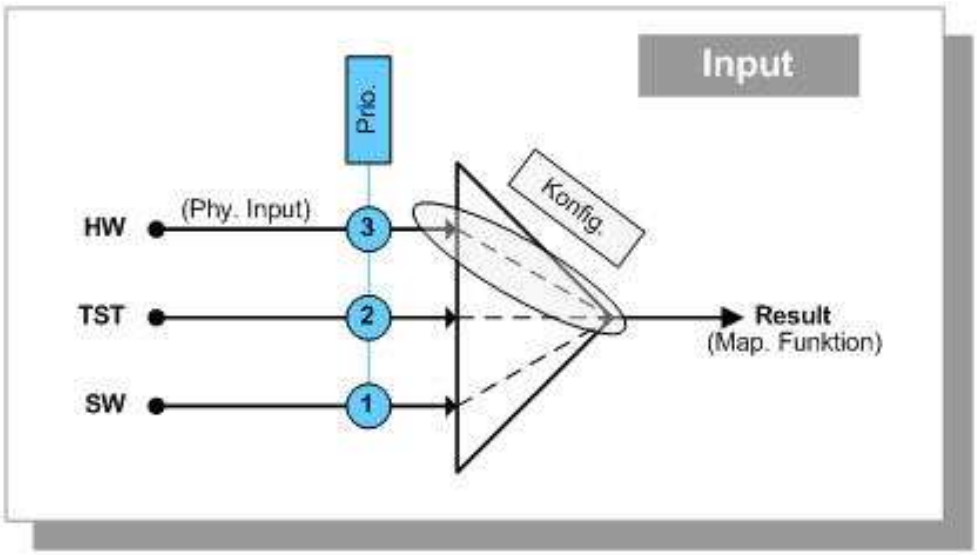


Fig. 13: The functioning of setting discrete inputs

9.2.8 Showing/settting discrete outputs

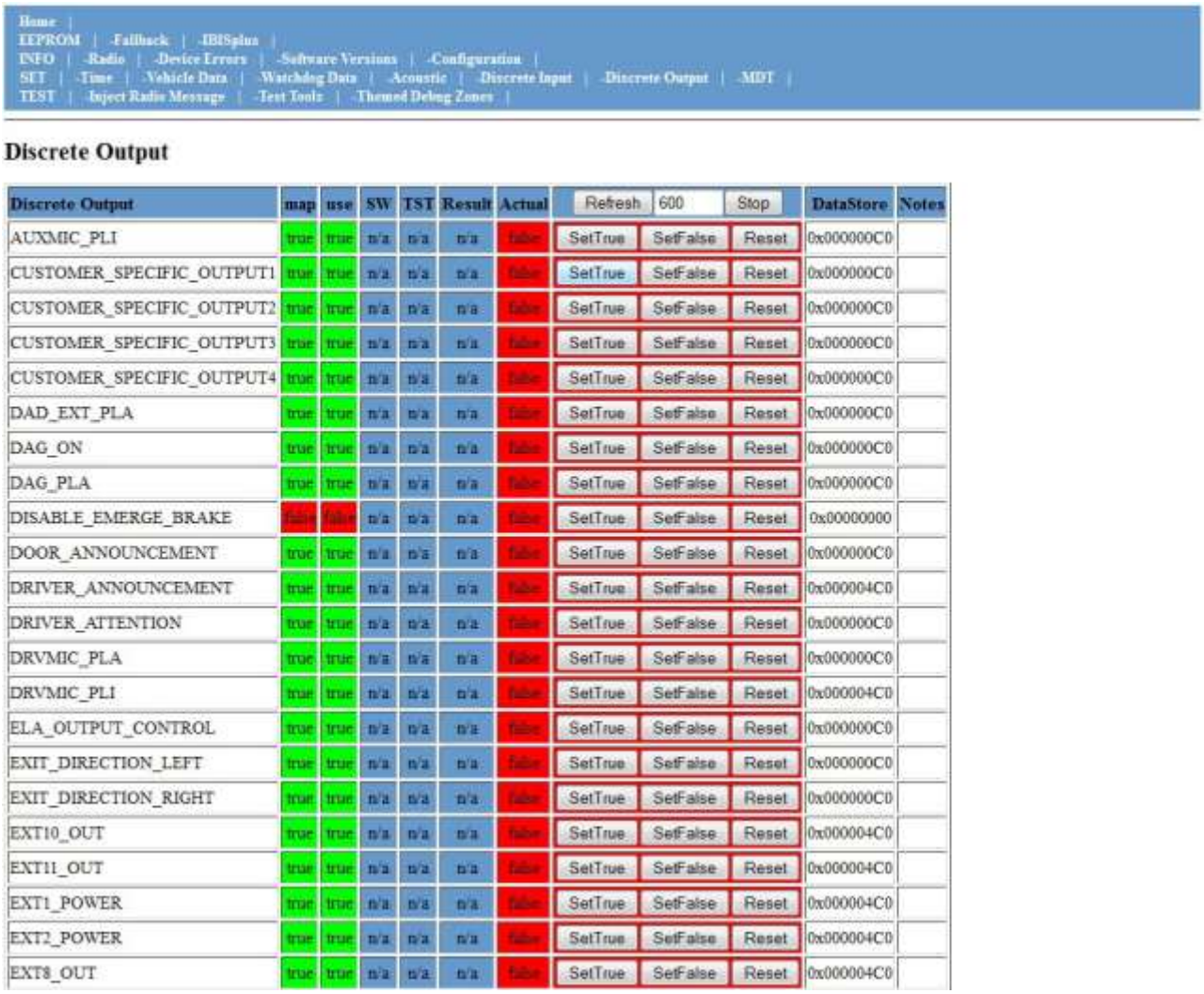


Fig. 14: Set discrete output

This page shows and simulates the status of the discrete outputs.

If the user clicks on 'Refresh' the page is updated every X seconds, where X corresponds to the number behind the button. This shows any changed statuses.

As well as checking the physical outputs, the outputs can also be set manually for test purposes.

A logic output can be simulated via the 'SetTrue' and 'SetFalse' buttons. The 'Reset' button restores the 'hardware status'.

The diagram below represents the functionality of the 'set discrete output' mechanism. Under normal circumstances, the signal of the application software 'HW' is mapped onto the 'Result' column (physical output). As soon as a person activates a test value (TST), this value is reproduced in 'Result' due to the higher priority. If the

'SW' column is then activated in addition, the value of this source is forwarded to 'Result' due to the even higher priority.

NOTE! These values aid the manufacturer during any necessary troubleshooting.

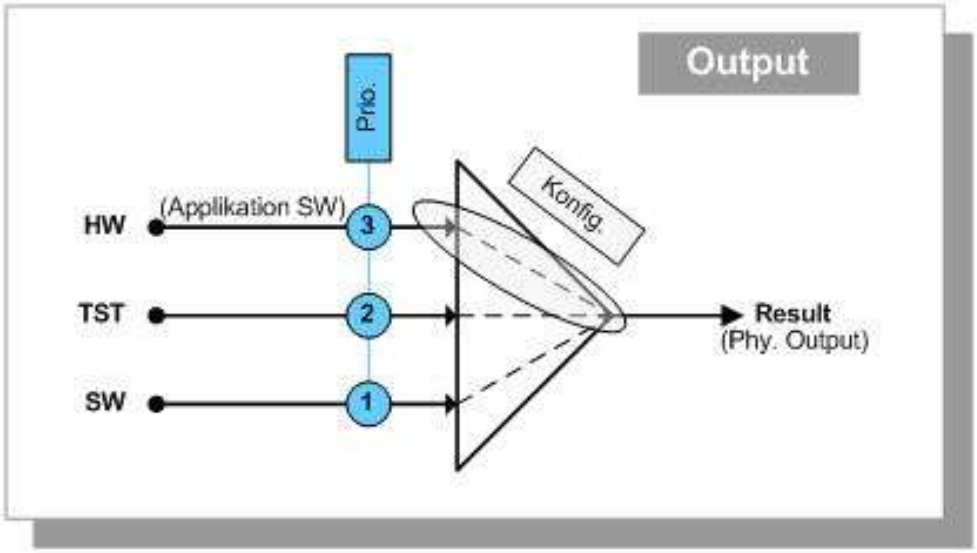


Fig. 15: The functioning of setting discrete outputs

9.2.9 Test tools / survey

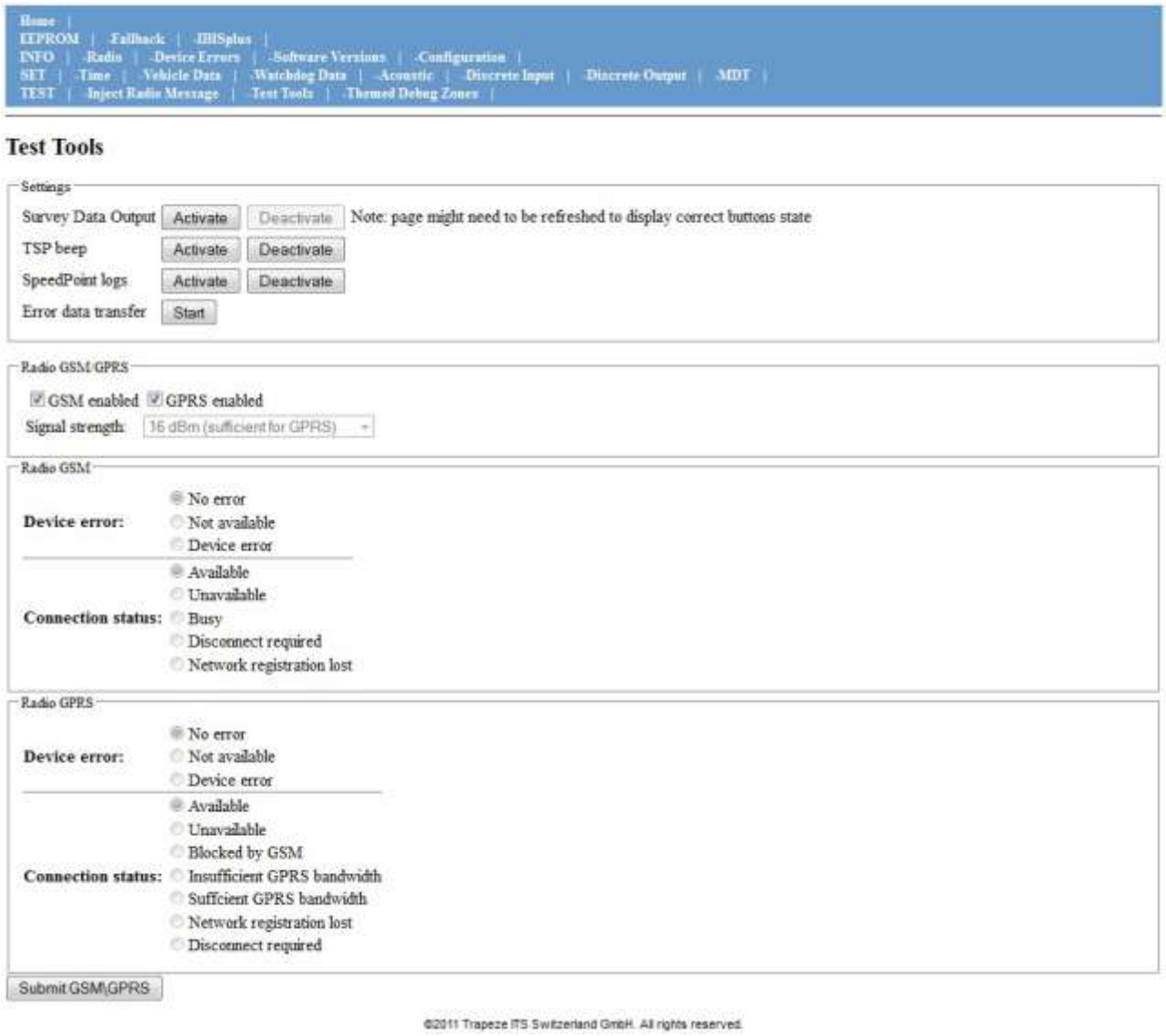


Fig. 16: Switching Survey Tool on and off

Press the button	Description
Activate Survey Data Output	Activates writing the data for the Survey Tool. The data is output at the service interface.
Deactivate Survey Data Output	Stops the output of survey data.
Activate TLP beep	Acoustic signal when sending a TLP message. The corresponding parameters must be

Press the button	Description
	set in the configuration (configuration.xml).
Deactivate TLP beep	Stops the acoustic signal when sending a TLP message.
Activate SpeedPoint logs	
Deactivate SpeedPoint logs	
Start Error Data Transfer	
All other information	These values aid the manufacturer during any necessary troubleshooting.

Tab. 9: Description of the test tools

WARNING! These settings are only active until the next restart!

9.2.10 Activating pre-defined log levels

This page is mainly used by the development department for locating errors and should not be changed without technical support from the manufacturer.

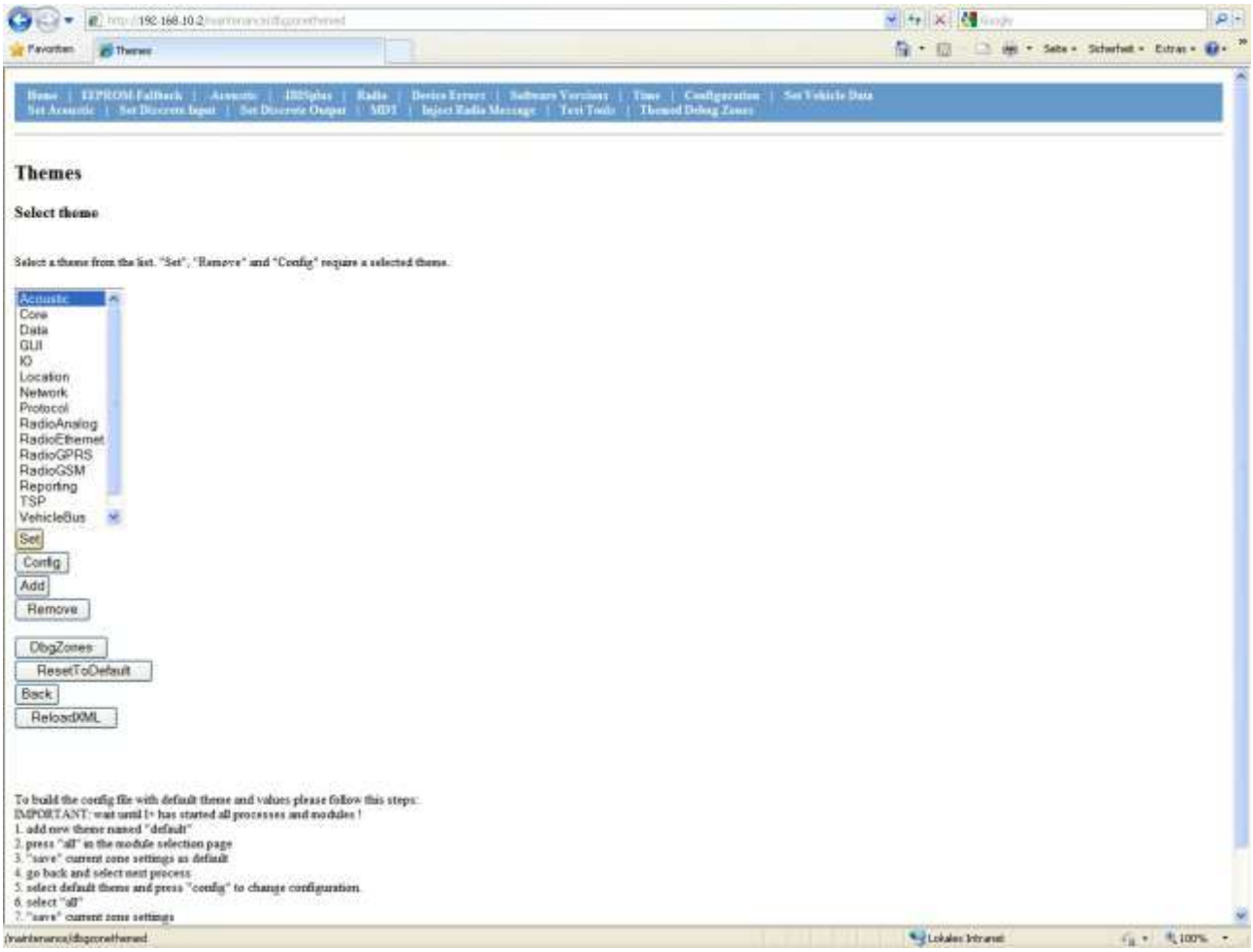


Fig. 17: Themes

Pre-defined settings for debugging the applications can be created and activated here.

Please note:

These settings are only active until the next restart!

Note:

A more convenient option to activate pre-defined log levels is provided by the **Mobile Maintenance Suite**.

9.3 Mobile Maintenance Suite (MMS)

This tool supports the system administrator for data analysis, but is also in particular a useful utility for loading data securely. (A more detailed description of the MMS function is provided in document 'Mobile Maintenance Suite MMS User Guide English'.)

See also

ITT website [▶ 35]

9.3.1 Establishing a connection with the ITT

To be able to establish a connection with the ITT, the following settings have to be made in the MMS:

IP address: 192.168.10.2 (or 192.168.10.4 for a viewer)

Ports:

20000 (IBIS application loader)

20001 (IBIS application)

20002 (data exchange)

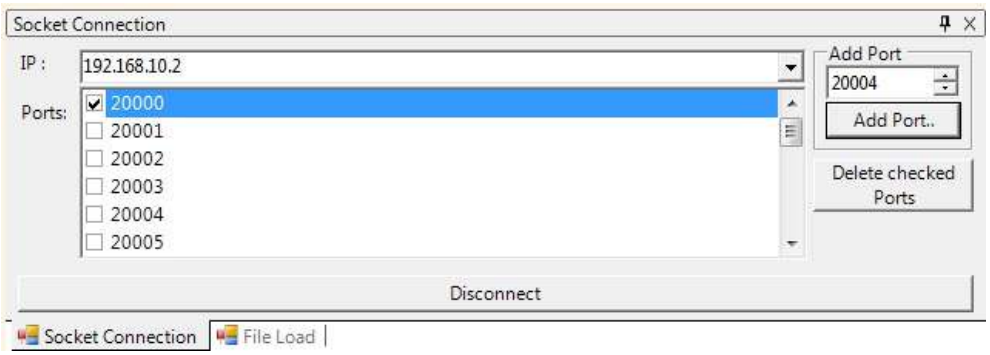


Fig. 18: Socket connection MMS

The MMS displays an excerpt from the internal statuses of the on-board computer online.

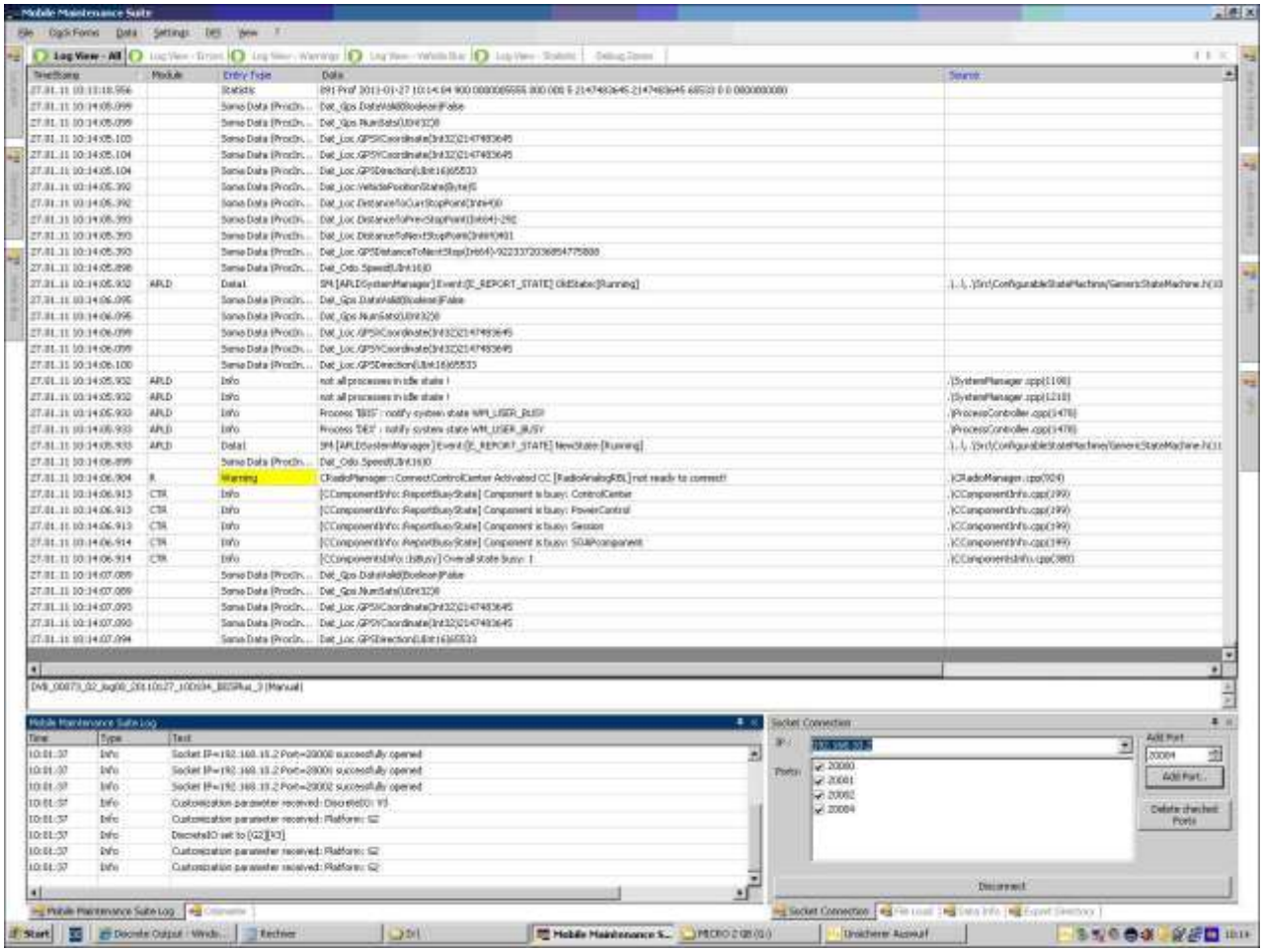


Fig. 19: Mobile Maintenance Suite user interface

This window displays all attributes which are either written to log files or displayed in the MMS. It is also possible to change the settings here.

The settings are effective immediately, without the need for confirmation.

Clicking on the row header selects or de-selects all fields. The Error, Warning and Squirrel fields should always be selected.

Any change will be active only until the next restart of the computer.

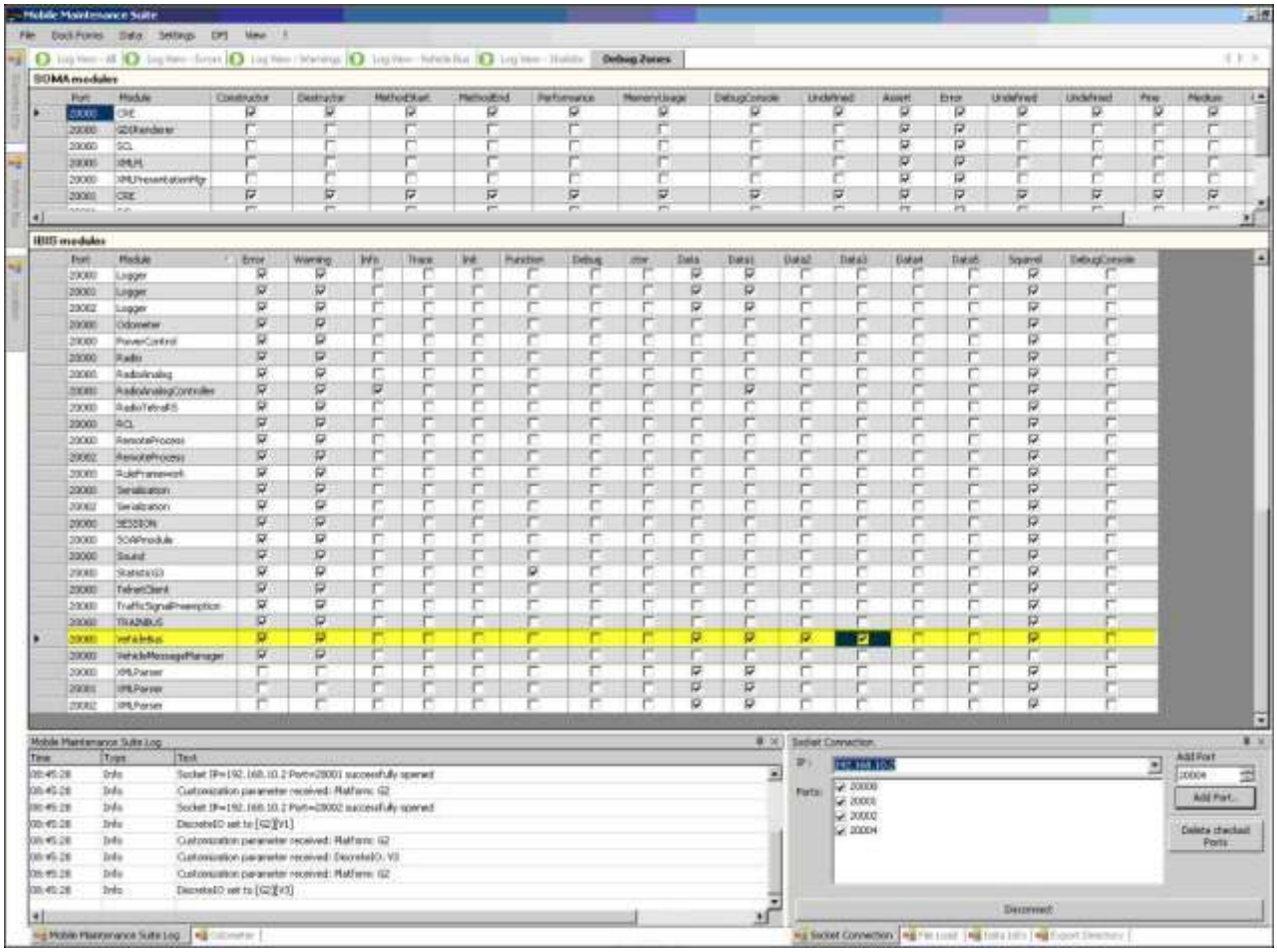


Fig. 20: Debug zones window

9.3.2 Application example: Vehicle bus messages

In order to view vehicle bus messages in the MMS, the necessary data must be released first. Select 'Data' to 'Data3' or possibly to 'Data5'.

With the suitable filter settings it is then possible to view the most important messages in the MMS (e.g. 'Data' shows those messages which are actually sent to or received by the vehicle bus).

Possible filter settings

Modules: 'VB'

Entry type: 'Data' (possibly also 'Data1' to 'Data5')

Data '::Write' and '::Read'

9.3.3 Displayed data

The represented data is divided into sub-areas, some data is suppressed due to restricted capacity.

9.3.3.1 Location

This area shows the current location status or current vehicle position. The current vehicle position is shown with the help of three columns. These contain the attributes of the following stops:

Previous: Previous stop.
Stop that lies before the current vehicle position in the pattern.

Current: Current stop.
If a productive stop is detected at a stop or an early departure is detected at a first stop ('Vehicle Position state' has the value PRODUCTIVE_STOP_INSIDE_STOP_ZONE), the attributes of this stop are shown in this column. Otherwise the values of this column are irrelevant.

Next: Next stop.
Stop which the vehicle is or will be approaching.

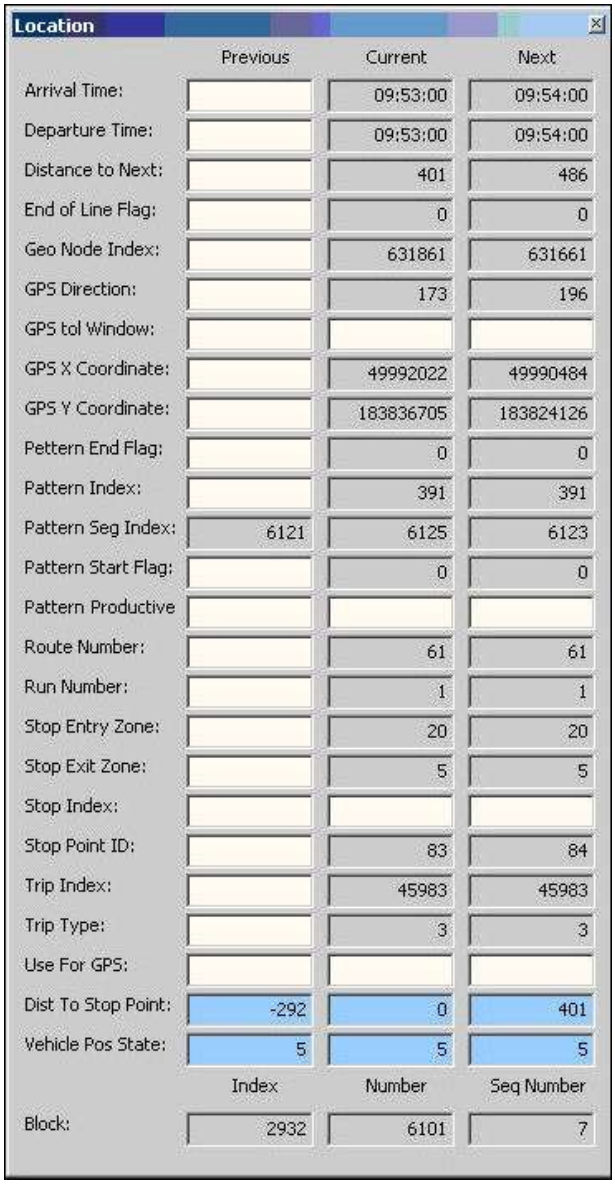


Fig. 21: Location window

Stop attributes

Attribute	Description
Arrival Time	Scheduled arrival time at this stop
Departure Time	Scheduled departure time from this stop
Distance to next	Distance from this stop to the next stop in the pattern
End of line flag	Terminal stop flag
Geo Node Index	Geonode index

Attribute	Description
GPS Direction	GPS direction of the stop (in degrees)
GPS TolWindow	Radius of the GPS tolerance window of the stop. If the GPS position of the vehicle is within this tolerance window, a logical distance to the stop can be calculated from GPS air-line to the stop.
GPS X Coordinate	X coordinate of the stop (longitude) in ms.
GPS Y Coordinate	Y coordinate of the stop (latitude) in ms.
Pattern End Flag	This flag is set if the stop is the last in the pattern.
Pattern Index	Pattern index
Pattern Segment Index	Pattern segment index
Pattern Start Flag	This flag is set if the stop is the first in the pattern.
Route number	Route number
Run number	Run number
Stop Entry Zone	Distance in metres from the start of the bus bay to the targeted stopping point
Stop Exit Zone	Distance in metres from the targeted stopping point to the end of the bus bay
Stop Index	Stop index
Stop Point ID	Generated operating time ID of the stop

Attribute	Description
Trip Index	Trip index
Trip Type	Trip type 1: Depot exit 2: Reassignment trip 3: Normal trip 4: Depot entry 5: Trip without passengers
Use For GPS	GPS positioning on: if this flag is set, the stop is used for GPS corrections.

Tab. 10: MMS description - Location A

Dynamic attributes

At the moment, the 'Vehicle Position state' attribute is displayed not as a text but as a number. The meaning of the number is shown in the table below.

Attribute	Description
Distance to stop point	Distance from the current vehicle position to the corresponding stop. Distance > 0: Vehicle position before stop in travelling direction Distance < 0: The stop is before the vehicle position in the travelling direction.
Vehicle Position state	Internal status of the location: 1 TRIPMODEL_NOT_LOADED, UNDEFINED There is no positioning data. 2 OFFCOURSE The vehicle has left the route. 3 ROUGH_POSITIONED The vehicle is roughly positioned. 4 EXACT_POSITIONED The vehicle is exactly positioned. 5 PRODUCTIVE_STOP_INSIDE_STOP_ZONE A productive stop has been detected outside the stopping zone. 6 INSIDE_CAPTURE_ZONE The vehicle is inside the capture zone of a stop. 7 BETWEEN_STOPS The vehicle is positioned exactly between two stops. 8 PRODUCTIVE_STOP_BETWEEN_STOPS A productive stop has been detected between the stops. 9 EARLY_DEPARTURE_DETECTED An early departure has been detected at

Attribute	Description
	a departure stop.

Tab. 11: MMS description - Location B

Block attributes

Attribute	Description
Block Index	Block index
Block Number	Block number
Block Seq. Number	n-th trip within the **block**

Tab. 12: MMS description - Location C

9.3.3.2 Odometer

The odometer values are shown in this area. A distinction is made between the current odometer reading and the odometer value stored intermediately in case of GPS reception.

Attribute	Description
Counter Units [m]	Absolute odometer status in metres
Counter Pulses	No. of odometer pulses since last start-up
Counter Ticks [ms]	CPU ticks, ms since last start-up
GPSTM Units [m]	Absolute odometer reading upon latest GPS reception
GPSTM Pulses	Number of odometer pulses upon latest GPS reception
GPSTM Ticks [ms]	CPU ticks upon latest GPS reception
Driving	This flag is set if the odometer supplies at least one pulse per second

Tab. 13: MMS description – Odometer

9.3.3.3 Discrete I/O

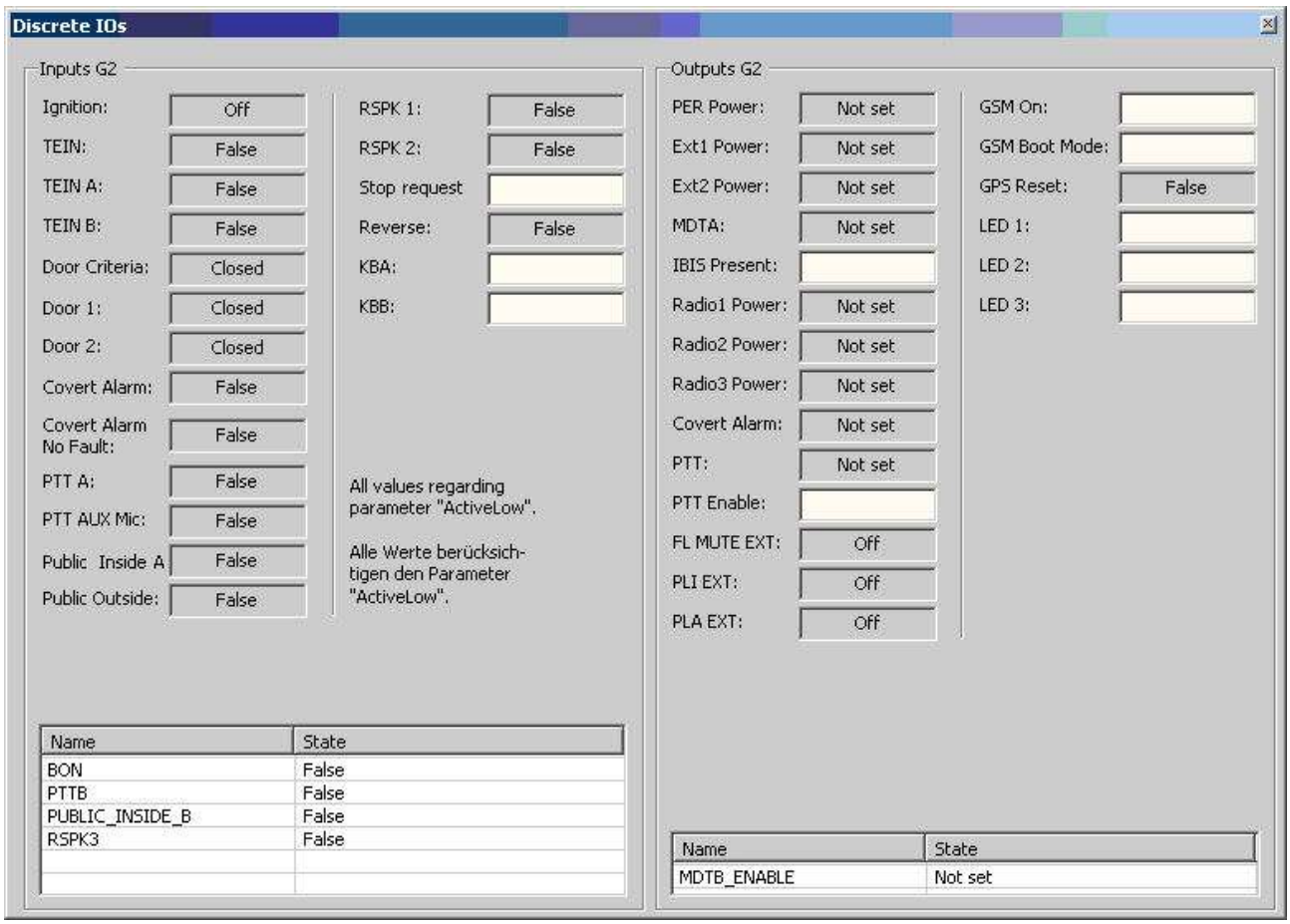


Fig. 22: Discrete I/Os window

Description of some of the discrete inputs:

Attribute	Description
Input Ignition	0: ignition off 1: ignition on
Input Door criteria	0: Door criterion not set 1: **Door criterion** set (door can be opened)

Attribute	Description
PTT	Push To Talk: Driver microphone transmission button pressed
PA	Public Address: Driver → passengers PTT button pressed
Covert	Emergency call (covert alarm) pressed

Tab. 14: MMS description - Discrete I/Os

9.3.3.4 Radio (not active at the ITT)

The fields describe various internal statuses of the radio controller (RC) and the connection status between vehicle and control centre.

Attribute	Description
RCMainOM	RC operation mode for internal testing
RCFallbackOM	RC operation mode for internal testing
DataConMode	RC operation mode for internal testing

Attribute	Description
VoiceConMode	RC operation mode for internal testing
CurrVoiceChannel	Currently used physical voice channel. If the RC is currently in data mode, this box shows the last used voice channel (since last voice connection or last fall-back mode).
RBL_State	Connection status between vehicle and control centre: Disconnected Vehicle working in data fallback mode. Connected Vehicle working in data mode. VoiceData Voice connection established between vehicle and control centre. AnnouncementData Vehicle receives announcement from control centre. CASendPhaseData Emergency voice connection to control centre. Vehicle is currently transmitting to control centre. Dispatcher can listen into the vehicle. CAReceivePhaseData Emergency voice connection with control centre. Vehicle is currently receiving from control centre. Dispatcher can talk to the vehicle. InactiveVehicleLogOffInProgress Vehicle is trying to log off from the control centre and is just waiting for control centre acknowledgement. This status

Attribute	Description
	occurs when switching a vehicle off. InactiveConnectedToRC Vehicle is logged off. It is not participating in data radio. VoiceFBActiv Vehicle is operating in open voice radio. Driver is currently talking to the control centre.

Tab. 15: MMS description – Radio

The 'RBL_State' attribute can have other statuses. These are intended for internal development test purposes.

9.3.3.5 GPS

If the on-board computer has a GPS receiver and GPS signals are being received, the current GPS data is shown in these fields.

Attribute	Description
X Coordinate	Current GPS X-coordinate (longitude)
Y Coordinate	Current GPS Y-coordinate (latitude)

Attribute	Description
Direction	Current GPS direction The vehicle must be travelling at min. 5 km/h to determine a valid GPS direction.
DistanceToNextStop	Distance from vehicle to next or current stop in metres (vehicle positioned at stop). The air-line distance can only be calculated if the GPS coordinates of the relevant stop are defined in the data supply.
DistanceToPrevStop	Distance from vehicle to last stop in metres. The air-line distance can only be calculated if the GPS coordinates of the last stop are defined in the data supply.

Tab. 16: MMS description – GPS

9.4 Access to the file system

The ITT has four partitions, three of which are write-protected.

Description	Content	Address (xx)
OS	Operating system Windows XP Embedded	C$
App	ITT application and services	D$
Data	Data supply Media files Map data for navigation	E$
Scratch	Log files Download directory Upload directory Statistical data	F$

Tab. 17: Partitions of the ITT

To access the individual partitions of the ITT, the following address has to be entered in the Explorer:

Address: `\\192.168.10.2\xx`

As three of the four partitions on the ITT are write-protected, only the Scratch partition can be accessed fully. The other partitions can only be read-accessed.

Important:

Changes can be made to the write-protected partitions but they will be reset at the next start and hence never become active.

Glossary

Base version

The base version denotes to a complete data status in the data supply database. A base version is a self-contained data status without any references to external data. Abbr. BV

Block

Describes the service provided by a vehicle during the day. It is a connected chain of trips, beginning with the depot exit and ending with the depot entry. The block is covered by a vehicle and can comprise several routes. There can also be a change of driver within the block.

Cabinet file

Cabinet files are compressed packages with a certain number of files that belong together. The format of a cabinet file is optimised for maximum compression. The various consumers, e.g. IBISplus, MFD etc. are able to unzip these files and move them into the corresponding internal directories.

Control centre

Comprises the control computer and the radio controller

Data supply

The data supply includes all data that is centrally managed by the customer and which changes from time to time. This includes stop and route information as well as play list data. Abbreviation: DS

Depot Data Manager

A component of the LIO control system, which coordinates the vehicles that are to be loaded with the data supply or from which the statistical data is to be downloaded. The Depot Data Manager manages the upload/download jobs for the vehicles and their peripheral devices and for DPI signs such as PACOS-G4. Abbr.: DDM

Door criterion

Depending on the vehicle wiring, either 'door criterion on' or 'door opening on' is sent to the IBISplus. This document presumes that the event 'door criterion' is sent to IBISplus.

GPS

Global positioning system Satellite-based system for determining the geographic position of moving objects such as planes, buses, ships, etc.

GSM

Global system for mobile communications; radio method in digital trunk radio.

IBISplus

Integrated on-board information system: Modern on-board computer

LIO-Data

Data supply program for the recording of vehicle, route, timetable, control computer and DPI data. This data is then prepared for the individual LIO components.

Mobile Maintenance Suite

Maintenance software for various maintenance tasks in IBISplus, PACOS and MFD (including login, data transfer). Abbr. MMS

Odometer

Evaluation of the odometer pulses in metres.

Parameter

Definition of values that are evaluated in the program.

XML format

This file format is used to exchange data with a hierarchical structure. Representation is in text format. File extension xml stands for extensible markup language.

Index

X