AUTO *monitor*

Complete Vehicle Condition Monitoring







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OVERVIEW

AutoMonitor is a complete vehicle condition monitoring system, which incorporates four technologies in one product. The AutoMonitor contains a digital tachograph that monitors the activities of drivers. One of the main purpose of a tachograph is to urge drivers to take adequate rest after prolong hours of driving. The wellbeing of drivers gets compromised if the driver does not take regular break hours. The AutoMonitor also has an integrated vehicle rollover detection system that predicts an impending rollover situation and provides a feedback indication to the driver via the provided driver aid equipment. AutoMonitor comes with a GPS Tracking system that lets the owner monitor and track vehicles online in real-time. The health monitoring aspect of AutoMonitor monitors vehicle performance such as the performance of a shock absorber and brakes. Additionally, the AutoMonitor can also monitor engine diagnostic codes via CAN Bus.

Figure 1 provides an overview of the AutoMonitor system.



Figure 1: Overview of AutoMonitor

1. UNPACKING AND FIRST TIME USE

Congratulations on having AutoMonitor for your vehicle. Before you start to use this product, please take a note of all the accessories provided with it. A standard AutoMonitor kit will include the following items:

- Vehicle Unit
- Driver's Aid Module
- Rollover Sensor
- Motion Sensor
- GPS Antenna
- GSM/GPRS Antenna
- PC and auxiliary cables

2. INSTALLATION

AutoMonitor must be installed by a trained technician as the equipment will need to be calibrated once it is installed in a vehicle. The calibration of the equipment cannot be performed without a workshop card, which is only provided to a trained technician.

2.1 Vehicle Unit

Vehicle Unit (VU) or dashboard equipment has the standard dimensions as an automotive CD player, which makes it easy to fit in most vehicles that have dedicated space for a CD player.

Vehicle unit requires constant battery voltage, even when the ignition switch is off. Ignition signal wire is connected to VU, which is used to sense when vehicle is switching on. Additionally, an illumination/backlight signal is provided to VU, which controls the LCD backlight of VU.

Provided GPS antenna and the GSM/GPRS modem antenna connects to the back of the VU. The vehicle tracking feature of AutoMonitor requires an Internet enabled SIM card in order for it to be able to send vehicle position and other parameters to the control centre (control server). The SIM card should be inserted at the back of vehicle unit (VU).



Figure 2: AutoMonitor - Front View

- 1 Slot 1 status
- 2 Slot 2 status
- 3 Slot 1 card inserted
- 4 Slot 2 card inserted
- 5 Slot 1 current activity
- 6 Slot 2 current activity
- 7 Audio setting
- 8 Rollover status
- 9 GPS status
- 10 GSM signal level
- 11 Current operational mode
- 12 Current time

- 13 Attention LED
- 14 Thermal Printer
- 15 PC connection port
- 16 Menu/Return button
- 17 Previous key
- 18 Next key
- 19 Ok/Enter key
- 20 Smartcard slot 1
- 21 Smartcard slot 1 status LED
- 22 Smartcard slot 2
- 23 Smartcard slot 2 status LED



2.2 Driver Aid

The driver aid unit indicates rollover state of the vehicle. When the vehicle is safe and stable, where the rolling-over probability is little, the driver aid displays green light. When the vehicle's rollover state is above the safe zone but below the critical zone, an amber light is lit as warning. When the vehicle has approached the critical zone of rolling over, a red light is lit to indicate the vehicle is about to rollover unless slowed down and handled safely.

The driver aid unit also contains a speaker which sounds audible alarms when the vehicle's rollover state is not in the safe zone. The audible alarm can be switched off through the settings menu under audio section.

The driver aid unit should be mounted on the dashboard, where drivers can see it clearly without any distraction to the driving style.

Note: Driver aid unit will flash all three LED lights if there is a communication problem between the dashboard unit and the rollover sensor.



Figure 4: Driver's aid module

2.3 Rollover Sensor

Rollover sensor module constantly monitors the motion of the vehicle and determines whether the vehicle is in the safe state or it's approaching the rollover situation. The rollover sensor module also performs other tasks such as brake performance monitoring and shock absorber performance monitoring. The sensor should be mounted close to the rear axle, at the middle of the vehicle. The connector plug on the rollover sensor should face forward. The sensor should be mounted as horizontal to the ground, where the bottom of the sensor should face the ground.

Once the sensor is mounted on the vehicle and the connector plug is connected to the dashboard unit, the service personal should verify the connectivity and also check the orientation angle. If the vehicle is standing flat, the dashboard unit should display the orientation angle for pitch and roll axes as close to zero as possible.



Figure 5: Rollover sensor module.

2.4 Motion Sensor

Motion sensor (tacho sensor) measures speed and distance travelled by a vehicle. The tacho sensor is mounted in the gearbox, where it picks up revolutions of gear output that are used to measure distance travelled by the vehicle and its current speed.



Figure 6: Motion Sensor module.

2.5 Calibration

AutoMonitor needs to be calibrated regularly according to the local regulation. The motion sensor and the rollover sensor both need to be calibrated by a trained workshop technician.

3. OPERATION

3.1 Tachograph

AutoMonitor's tachograph feature records driving hours of the drivers as well as grants access to the equipment via a smartcard. When a driver inserts his smartcard, the tachograph authenticates the driver and starts recording activities such as driving times, break & rest times, availability times and work times. Tachograph also records various other activities such as over-speeding, distance travelled by each driver, various events and faults.

Symbol	Activity
Φ	Rest/Break
Е	Available
Δ	Driving
Γ	Work
OUT	Out of condition
N	Ferry/train

Table 1: List of tachograph activities

Tachograph	Tachograph Vehicle Unit		
0 → × × BB	0 ≪ ≈ ▲ 8 8		

3.1.1 Tachograph Home Screens

Screen No	Home Screen
 Current activities for slot 1 and slot2 	Current activity for slot Current activity for
2. Current Activity for slot 1	Odometer → 1∆01h23 ■ 00h41 △ 158088 km 42 kph I ▲ ■ ■ ■ ■ ■ Current speed
3. Current Activity for slot 2	Current activity for slot 2 → 3E00h30 ■ 01h21 △ 158088 km 42 kph ■ ▲ ■ ■ ■ 3
4. Weekly driving data	Last week's driving Last two weeks' driving hours for slot 1 Last week's driving hours for slot 1 Last week's driving Last two weeks' driving hours for slot 2 Last two weeks' driving hours for slot 2
5. Current driving hours for slot 1 and slot 2	Current driving hours for slot 1 1∆01h23 ■ 00h41 Δ 3∆00h00 ■ 01h21 01h21 01h21 01h21 00h41 Δ
	for slot 2 period for slot 2

3.1.2 Menu L	₋ayout			
Primary Menu	Sub menu 1	Sub menu 2	Description	
	Light gord	Driver slot?	Ejects card in slot 1.	
		Co-Driver slot?	Ejects card in slot 2.	
		Info	Displays cardholder information for card in slot 1	
	Driver (Slot	Display	Displays activities and events stored on card in slot 1	
	1)	Print	Prints activities and events stored on card in slot	
		Info	Displays cardholder information for card in slot 2	
	Driver (Slot	Display	Displays activities and event stored on card in slot 2	
Tachograph	2)	Print	Prints activities and events stored on card in slot 2	
) / chicle loit	VU Display	Displays activities, events, calibration record stored on VU	
	venicie Unit	VU Print	Prints activities, events, calibration record stored on VU	
		Place Begin	Adds work begin place record	
	Place Entry	Place End	Adds work end place record	
	Spec.	Out of scope	Adds out-of-scope specific condition	
	Condition	Ferry/Train	Adds ferry/train specific condition	
		Lock-in	Sets company lock-in	
	Company	Lock-out	Sets company lock-out	
Date/time	Date / time		Displays current date/time	
	Info		Displays rollover sensor information	
Rollover	Status		Displays rollover status	
	Data		Displays rollovers sensor data	
	Status		Displays GPS status	
GPS Tracker	Data		Displays GPS data	
	Tracker		Displays tracker info	
	Card Daily		Prints daily activities from a smartcard	
	Card Events		Prints events stored on a smartcard	
	VU Daily		Prints daily activities stored on VU	
Print	VU Events		Prints events stored on VU	
	Technical		Prints last calibration record stored on VII	
	Oversneed		Prints overspeeding records stored on VU	
	Summary		Displays health summary	
	Brake Info		Displays health summary	
	Suspension		Displays brace performance info	
	Mass		Displays suspension performance into.	
Hoolth			Displays vehicle mass	
пеаш	DIC Engine Date		Displays ulagrostic trouble codes	
		Minor Sonvice	Minor convice monu	
	Service			
	Service Log	Major Service	Major convice monu	
	Diaplay		Display related acttings	
	Sound		Audio rolated settings	
	Souria Dete/Time		Audio related settings	
Settings	Date/Time		Date/ Imezone related settings	
	Daylight			
	Units			
Ourstand	Language		Interface language settings	
System	ΙΠΙΟ			

Inserting a smartcard

When a valid smartcard is inserted into any slot of the VU, the device will initialise card session. The card must be inserted when the vehicle is stationary, otherwise a 'card inserted while driving' event will be marked. Once the device has found the card to be valid and has loaded up the current session, the device will display a splash screen, which will include the type of card inserted and the name of the card holder.

Ejecting a smartcard

A smartcard needs to be safely ejected before it is pulled out from its slot. To eject the card, first make sure the vehicle is not in motion then press the Menu key and select 'Tachograph' followed by 'Eject card' and then select the slot whose card is to be ejected. The device will write any pending activity/date to the card and will safely disconnect it. As the card is ejected, the slot number corresponding to the card slot will be removed from the screen, the user can then safely pull out the card.

3.1.3 Smartcard

Smartcards are security key cards that provide access to various features of the brake meter. Smartcards also hold identity data as well as activity data. There are four types of smartcards currently supported in AutoMonitor. The types of cards currently supported are synchronous memory cards.



3.1.4 Operating modes

There are four operating modes of the tachograph. Each mode is defined by the level of access granted to a particular user for various features of the tachograph application. An operating mode is triggered by the insertion or withdrawal of a smartcard. The four operating modes are listed below:

- Operational Mode (Δ)
- Calibration Mode (X)
- Control Mode (B)
- Company Mode (A)

The following table summarises the operational modes of the tachograph.

C	Operating Mode			Driver Slo	ot	
		No Card	Driver Card	Control Card	Workshop card	Company Card
Co-driver slot	No Card	Operational	Operational	Control	Calibration	Company
	Driver Card	Operational	Operational	Control	Calibration	Company
	Control Card	Control	Control	Control*	Operational	Operational
	Workshop Card	Calibration	Calibration	Operational	Calibration*	Operational
	Company Card	Company	Company	Operational	Operational	Company*

Table 2: Operational modes of tachograph

*Only the card in the driver slot is used.

3.1.4.1 Operational Mode (Δ)

Operational mode is triggered by inserting a driver card into one of the card slots. When operational mode is active, the LCD screen will display (Δ) icon on the top right corner of the screen. The operational mode allows users to access driving activities, specific conditions, work places, and report printing features.

3.1.4.1.1 Driver's Activities

Users can manually select an activity when the vehicle is stationary, except for the driving activity. To manually select an activity, press OK button. When activity menu appears on the screen, press the Menu button (\checkmark) to change the activity of the driver slot and press OK button to change the activity of the co-driver slot. The tachograph module records the following driving activities:

ГWork		Avai I	Е
11 1 - • •	l 🛋 all	ib B	
4			0

3.1.4.1.1.1 Driving (∆)

Driving activity is automatically set when the vehicle is moved. Driving state is only set for the card in the driver's slot (Slot 1), while the activity for the co-driver slot is set to Availability while the vehicle is moving. When the vehicle stops, the activity for the card in the driver slot is changed to Work, whereas the activity for the card in the co-driver slot is kept at Availability.

3.1.4.1.1.2Work (Γ)

Work activity is automatically set when the vehicle has come to a stationary point after the activity of driving for driver slot. Work activity can be manually set by the user when the vehicle is stationary.

3.1.4.1.1.3Availability (E)

Availability is selected automatically for co-driver slot when the vehicle is moving. Users can manually select this activity when the vehicle is stationary.

3.1.4.1.1.4Break/Rest (Φ)

Break/Rest activity can be manually set by the user when the driver intends to take rest and the vehicle is stationary.

3.1.4.1.1.5 Continuous Break

Continuous Break period is the accumulated period of continuous 15 minutes or over for activities of Break/Rest, Availability, and Unknown period since the last Driving or Work activity. For continuous driving of over 4h30 minutes, a continuous break of 45 minutes or over is required.

3.1.4.1.1.6 Continuous Driving

Continuous driving period is the accumulated period of driving since the continuous break period of 45 minutes or over. When the continuous break period is reached to 45 minutes or above, the continuous driving period will be reset to zero at the next driving activity.

If continuous driving period is reached to 4h15 minutes, the device will turn on Attention LED and will display a notification message to inform the driver to take 45 minutes break/rest.

When the continuous driving period is reached to 4h30 minutes, the device will display another notification message and the attention LED will stay on blinking once per second.

3.1.4.1.2 Specific conditions

Specific conditions are set by the drivers to indicate activity other than the four activities mentioned above. The specific conditions include the following activities:

- Out of scope (begin/end)
- Ferry / Train Crossing

Specific condition can be selected by accessing the Tachograph menu.



When ferry/train crossing condition is selected, the condition will be automatically cleared when the vehicle is driven. The specific condition will automatically be cleared when a card in the driver-slot is inserted or removed.

3.1.4.1.3 Places

Drivers and co-drivers can manually select the place where the work starts and ends. Whenever a driver card is inserted into the device, the device will prompt the user to select the location of the place where the work begins. When the card is ejected from a slot, the device will prompt the user to select work end place. Users can manually select place using the Tachograph menu and then selecting Places Entry menu.



3.1.4.2 Calibration Mode (X)

Calibration mode is used by the tachograph when a workshop card is inserted or as indicated in Table 2. The calibration mode allows technicians to configure the device and perform calibration as well as to diagnose the system.

To activate calibration mode, insert a workshop card into any card slot while making sure there is no card in the other slot.

3.1.4.3 Control Mode (B)

Control mode is used by the tachograph when a control card is inserted or as indicated in Table 2. The control mode allows control inspectors to print technical report or perform download operation as well as to see over-speed report.

To activate control mode, insert a control card into any card slot. There should not be any card in the other slot except for a driver card. While the tachograph is operating in control mode, if any activities such as printing, displaying of stored activities, downloading is performed, the tachograph will record it as control activity into the control card, driver card (if inserted) and in the vehicle unit (VU).

3.1.4.4 Company Mode (A)

Company mode is activated when a company card is inserted or as indicated in Table 2. The company mode allows for displaying, downloading and printing of the data records stored in the vehicle unit which has been locked by this company.

A company should lock-in the tachograph immediately so that any new data recorded into the system could be protected by that company.

To activate company mode, insert a company card into any card slot.



3.1.5 Activities

3.1.5.1 Driver Activities

Driver activities include the following types of activities:

- Driving
- Work
- Availability
- Rest/Break
- Specific condition
- Work start/end place names.

When the vehicle starts moving, the activity for the driver slot will be automatically changed to 'Driving' and the activity for the co-driver slot will be changed to 'Availability'. When the vehicle becomes stationary after a period of driving, the activity for the card in driver slot will be changed to 'Work' and the activity for the co-driver slot will stay at 'Work'.

Drivers should take break after driving a continuous of 4 hour and 20 minutes. The tachograph will display a warning message if the driver has driving vehicle for a continuous of 4 hour and 30 minute. When such a warning message appears on the screen, the user should take rest for at least 15 minutes.

Whenever a driver or workshop card is inserted into the card slot, the tachograph application will prompt user to enter work start place name. Use the arrow keys to scroll through available places. And when a driver or workshop card is removed, the device will prompt the user to enter the work ending place name.

Drivers can record their activities more discretely by setting specific conditions in case if the vehicle is carried on a ferry or the vehicle is waiting at a train crossing. Specific condition activities can be selected through AutoMonitor's Tachograph menu. Users can select 3 activities type:

- Out of scope (Begin)
- Out of scope (End)
- Ferry / Train Crossing

The *out of scope* activity could be selected when the vehicle is being driven for applications that are out of the scope of the tachograph regulation such as on non-public roads, or regions where tachograph regulations are not active.

3.1.5.2 Control Activities

Control activities include the activities performed by a control operator when tachograph is operating in Control Mode. The following activities are recorded as control activities by the tachograph:

- Card Downloading
- VU Downloading
- Printing
- Display

3.1.5.3 Company Activities

Company activities include the activities performed by a company card holder when tachograph is operating in company mode. The following activities are recorded as company activities by the tachograph:

- Card Downloading
- VU Downloading
- VU Lock-in
- VU Lock-out

3.1.5.4 Calibration Records

Calibration records are created when tachograph is operating in calibration mode using a workshop card.

3.1.6 Events and Faults

Tachograph constantly monitors various faults and events. Description of those events and faults is provided in the following pages.

3.1.6.1 Event Records

When an event is triggered, the AutoMonitor will display an event notification message. The message will contain the type of event being triggered and its brief description. The user will need to acknowledge the notification message by pressing any button from the front panel. Once an event message is acknowledged, the message will disappear from the screen. A record of the event will also be recorded into the vehicle unit. If there is a driver card or a workshop card inserted into the AutoMonitor, any relevant events to the smartcard will also be written onto the smartcard.



Figure 7: Typical event alert screen

Table 3 lists the type of event notifications displayed by the AutoMonitor.

Event	Description	Screen Message
Invalid Card	Indicates that an invalid, unformatted or unreadable, or an expired card is inserted	"Non-valid card"
Card Conflict	This event is raised when cards in the two slots of the tachograph conflict with the operating modes of the tachograph. Table 5 lists the scenarios when card conflict event is raised.	"Card conflict"
Time-overlap	This event is raised when the date/time of last withdrawal of a driver card is later than the current date/time of the tachograph equipment.	"Time overlap"
Driving without appropriate card	This event is raised when vehicle is moved while one of the conditions listed in Table 6 is met.	"Driv'g w/o approp. card"
Card inserted while driving	This event is raised when a tachograph card is inserted while the vehicle is in motion.	"Card insert. while driving"
Unsaved last session	This event is raised when a driver card or a workshop card is inserted, whose last session was not properly closed/saved.	"C/session not closed"
Over-speeding	This event is raised when the vehicle speed reached above the maximum speed set for the tachograph.	"Over speeding"
Motion sensor data error	This event is raised when the tachograph finds errors in the data obtained from the motion sensor.	"Sensor fault"
Rollover Event	This event is raised when vehicle's rolling force is approaching closer to the rollover. The event is recorded when the rollover detector issues a warning or a danger alert.	"Rollover Event"
Company lock	This event is raised when the tachograph is locked or unlocked by a company.	"Company lock event" "Company unlock event"
Rollover sensor fault	This event is raised when communication with the rollover sensor is dropped.	"Roll-Sensor Err"

Table 3: Events notification and description

A purpose code is recorded with the properties of an event. The description of each purpose code is listed in Table 4.

Purpose Code	Description
0x00	One of the 10 most recent (or last) events/faults
0x01	The longest event for one of the last 10 days of occurrence
0x02	One of the 5 longest events over the last 365 days
0x03	The last event for one of the last 10 days of occurrence
0x04	The most serious event of one of the last 10 days of occurrence
0x05	One of the 5 most serious events over the last 365 days
0x06	The first event or fault having occurred after the last calibration
0x07	An active/on-going event or fault
0x80	Manufacturer specific
	Table 4: Purpose codes for an event

When AutoMonitor detects that multiple cards are inserted into its two slots, the AutoMonitor will compare the card type of each card with the possibilities of card conflict listed in Table 5. If a card conflict is detected, an event notification will be triggered.

	Card Conflict	Driver Slot				
L.		No Card	Driver Card	Control Card	Workshop card	Company Card
slo	No Card					
er	Driver Card				Х	
lriv	Control Card			Х	Х	Х
0-0	Workshop Card		Х	Х	Х	Х
0	Company Card			Х	Х	Х

 Table 5: Scenarios when Card Conflict event is raised

When a vehicle starts driving, the AutoMonitor will check the appropriateness of each card inserted into the card slots according to the possibilities listed in Table 6. If AutoMonitor detects that vehicle is driven without an appropriate mode, a 'driving without an appropriate card' event will be triggered.

Driving without an appropriate card		Driver Slot				
_		No Card	Driver Card	Control Card	Workshop card	Company Card
slo	No Card	Х		Х		Х
er	Driver Card	Х		Х	Х	Х
	Control Card	Х	Х	Х	Х	Х
0	Workshop Card	Х	Х	Х		Х
5	Company Card	Х	Х	Х	Х	Х

Table 6: Scenarios when 'Driving without and appropriate card' event is raised

For example, the AutoMonitor will register 'driving without an appropriate card' event when the vehicle moves while there is a driver's card in the driver's slot along with any other card in the co-driver's slot.

3.1.6.2 Fault Records

When a fault is detected by AutoMonitor, a fault notification message will be displayed. Once a fault notification message is triggered, the user will need to acknowledge it by pressing any button from the front panel. The detected faults will be recorded by the AutoMonitor, which can be later downloaded to the PC. If a driver card or a workshop card is inserted, a copy of the faults related to the smartcard will be recorded onto the smartcard.



Figure 8: Typical fault notification screen

The description of the faults detected by AutoMonitor is given in Table 7.

Fault	Description	Screen Message		
Internal VU Fault	This fault is raised when the vehicle experiences an internal fault.	"VU internal fault"		
Printer Fault	This fault is raised when the built-in thermal printer is missing or does not communicate with the vehicle unit.	"Printer fault"		
Display Fault	This fault is raised when the LCD display is missing or cannot be communicated with.	"Display fault"		
Downloading Fault	This fault is raised when the vehicle unit detects a communication problem while downloading data to PC or a remote unit.	"Downloading fault"		
Sensor Fault	This fault is raised when motion sensor is missing or cannot be communicated with.	"Sensor fault"		
Card Fault	This fault is raised when there is a problem when reading/writing to/from a smartcard.	"Card fault"		
Table 7: Fault notifications and description				

3.1.6.3 Event Notification Service

The device can be configured to send notification messages via email and SMS services in case of an event or a fault. Additionally, the AutoMonitor can also send timely reports containing the recent state of the device. The schedule for the timely reports can be customised using the software.

3.1.6.3.1 Events Notification Configuration



Events Notification

Figure 9: Notification selection for email and SMS services

To configure the scheduling of timely reports, select the days and the hours on each day when AutoMonitor should send timely reports using SMS and email services. Press save to update settings.

3.1.6.3.2 SMS Configuration

SMS service sends out SMS notification messages. To enable the SMS service, set 'Enable SMS notifications' and enter the SMS phone numbers. Multiple mobile numbers can be entered if an SMS message is to be sent to multiple mobile phones. Press 'Save' to update settings.

onfigurati	on			_		
SMS	GPRS	SMTP	HTTP Post	Remote Servi	ce	
🔽 Ena	able SMS	6 notifica	tions			
SMS	From:		0412345678	9		
SMS	Recipien	t (s) :			Add to list	
			0423456789	0	Remove	
						Caub

Figure 10: SMS notification service settings

3.1.6.3.3 GPRS Configuration

The GPRS service allows communication with the AutoMonitor via the internet connection. This service is required for HTTP, SMTP and remote connection services. To enable GPRS service, select 'Enable GPRS' and enter Access Point Number (APN) of the sender's internet service providers.

-0	Configuration		
	SMS GPRS	SMTP HTTP Post Remote Service	
	🔽 Enable GPI	RS	
	APN:	internet	
	Usemame:		
	Password:		
	Gateway:		
			Save 📐

Figure 11: GPRS service configuration window

If GPRS service is not enabled or the GPRS configurations are not valid, the services that rely on GPRS will not be able to function.

3.1.6.3.4 SMTP Configuration

The Simple Mail Transfer Protocol (SMTP) service is used to send notifications that are configured to be sent by email. The user can specify the recipients of the notification emails.

ſ	Johnguration		
	SMS GPRS SMTP	HTTP Post Remote Service	e
	Enable Email notific	ations	
	SMTP Server:	smtp.autotest.net.au	
	SMTP Server Port:	25	
	Usemame:	usemame	
	Password:	password	
	Sender:	john.a@autotest.net.au	
	Recipients:	james.h@autotest.net.au	Save

Figure 12: SMTP service configuration window

3.1.6.3.5 HTTP Post Configuration

The HTTP post service can be used to send out live feeds of essential information to a webserver. This is useful if clients wish to build their own web based vehicle monitoring system.

Post URL	http://autotes	t.net.au/automonitor.php	*
			-
Server Port:	80		
Post Interval:	300	seconds	

Figure 13: HTTP post service configuration window

If the HTTP post service is enabled, the AutoMonitor will send periodic post feeds after 'post interval' seconds to the given post URL address. The following post fields will be sent with each http post query. The driver name fields will only be sent with the post query if there is a valid card in the AutoMonitor.

Post field	Description	Example	Unit
"timestamp="	Current time (Unix timestamp)	"timestamp=455678545"	
"rego="	Vehicle registration no.	"rego=rego1234"	
"vin="	Vehicle identification no.	"vin=VIN24323222"	
"odometer="	Odometer reading	"odometer=45688"	km
"lon="	Current longitude position	"lon=145.445785"	deg
"lat="	Current latitude position	"lat=-37.588640"	deg
"alt="	Current Altitude (above sea)	"alt=127.0"	m
"speed="	Current speed	"speed=24"	km/h
"heading="	Current heading direction	"heading=232.0"	true deg
"mass="	Current mass	"mass=3242"	kg
"driverFirst="	First name of cardholder in slot 1	"driverFirst=James"	
"driverLast="	Last name of cardholder in slot 1	"driverLast=Cook"	
"codriverFirst="	First name of cardholder in slot 2	"codriverFirst=Oliver"	
"codriverLast="	Last name of cardholder in slot 2	"codriverLast=Ken"	
"vuserial="	Vehicle unit serial no.	"vuserial=222421"	

Table 8: AutoMonitor feeds sent to webserver using HTTP post service

3.1.6.3.6 Remote service

The remote service connects to the vehicle tracking application running on a PC or a server. The AutoMonitor will try to establish a remote connection using the fixed servicer/PC IP address after every 'poll interval' many seconds. Once the AutoMonitor is remotely connected to the PC, the AutoMonitor will stay connected until the user disconnects it.

SMS GPRS SMTF	HTTP Post Remot	e Service	
Enable remote ser	vice		
Script file URL:	http://autotest.net.	au/remote_service.php	*
			-
(or) Fixed server			
Fixed Server IP:	123.045.067.89		
Server Port:	45556		
Poll interval:	300	eeconde	

Figure 14. Remote connection service configuration window.

If the IP address of the remote service likely to change, the user can specify a website link, where the current IP address of the remote device could be specified. If the script file URL is provided, the AutoMonitor will send a 'GET' request to the website and provide the registration number of the vehicle as an input parameter. The website could use the registration number and provide the current IP address of the computer where the tracking software is running. For example, if AutoMonitor is configured with the above script file URL displayed in Figure 14, the device will send the following HTTP query:

```
"GET /remote_service.php?rego=rego1234 HTTP/1.0\r\n" to host: "autotest.net.au" at port 80.
```

The expected response from the website should have the following fields to indicate the IP address (or hostname) of the remote PC:

{REGO}{REMOTE_SERVER}{PORTNUMBER}
Or,
{rego1234}{123.245.167.089}{5475}

The description of the expected response fields is given in Table 9:

Field code	Description
{REGO}	Registration number of the vehicle
{REMOTE_SERVER}	IP address of the remote server/pc
{PORTNUMBER}	Port number of the remote server/pc

Table 9: Response fields of the IP request query for remote service

3.1.6.3.7 Timely reports

The timely reports are sent to provide periodic updates on the status and condition of the vehicle via email. The following sample report indicates the information contained in a timely report.

Timely email report

Vehicle Information

 Vehicle Registration:
 REG30012345

 Vehicle Identification:
 VIN30012345

 VU Serial No:
 30012345-8040-255-21

 Odometer (km):
 121

 Date/Time:
 2014/09/17 11:00

 GPS Longitude:
 144.946069

 GPS Latitude:
 -37.830840

 Altitude (m):
 16

 Vehicle Mass (kg):
 1700

Vehicle Health

Brake Performance

TitleCurrentAverageMaximumDeceleration0.00g0.34g0.50gMFDD4.39m/s24.39m/s24.39m/s2

Suspension Performance

 Title
 Current Average Maximum

 Damping Ratio 20 %
 35 %
 37 %

 Rating
 13 %
 91 %
 100 %

Card Insertion/Withdrawal records

No	Card holder	Card No Card Expiry	Insertion Time	Withdrawal Time	e Odometer At	Insertion Distance
1	Leonhard Euler	2015/06/28	2014/09/17 00:00:00	00:01:06	121	0
2	Leonhard Euler	2015/06/28	2014/09/17 00:53:16	00:57:22	121	0

Figure 15: Sample timely report sent by email

3.2 Report Printing

Tachograph can print out a number of types of print reports. The reports can be printed onto paper using the built-in printer. The users can also view a printout report onto the AutoMonitor's LCD screen.

3.2.1 Card Activities

Card Activities printout allows cardholders to print stored activities data from their smartcard.

AUTOTEST AUTOMONITOR v1.0	(1) Product information
K 05/08/2014 09: 22 (UTC)	(2) Print date/time (3) Report type (24h card printout)
240 μκ ΔΔ	(4) Card holder details of the card in driver slot
Δ JOHN ALLEN ΔHR /191112932111 0 0	
29/04/2017	(5) Vehicle Identification Information
ΛVI N3543988939000 R /REG12345	(6) Manufacturer information
AUTOTEST AUTOMONI TOR	(7) Workshop information where last calibration was performed.
X WORKSHOP NAME XHR /224929885822 0 0 X 04/05/2016	(8) Last control information
BHR /329233939442 0 0	(9) Date of the activities
B 08/07/2014 03: 13 HY	(10) Unknown activities
04/08/2014 13	(11) Vehicle information of the vehicle where the card was inserted (Slot 1, driver slot)
<00: 00 00: 01 00h02	(12) Activities
Λ R /REG1234 44888 km	
Φ 00: 22 05: 40 05h18 ΔΔ *	(13) Vehicle information of the vehicle where the card was inserted (Slot2, codriver slot)
< 12:55 12:65 00h22	(14) Daily summary of the activities
Λ R /REG1234 Φ 16: 43 17: 33 01h33 ΔΔ	
Σ Δ 00h00 322 km	(15) Events and faults stored in the card and VU
$\begin{array}{lll} \Gamma & 00h00 & E & 00h00 \\ \Phi & 00h00 & < 00h00 \end{array}$	(16) Control place
ΔΔ 00h22	(17) Control officer's signature
9;Л	(18) Driver's signature

3.2.2 Card Events

Events stored on a smartcard can be printed using 'Print' menu. The following sample report illustrates the printout report of the stored events on a smartcard.

AUTOTEST AUTOMONITOR v1.0	
K 22/08/2014 10:14 (UTC)	(1) Printout date/time
КК 9;НК	(2) Printout type (events stored on card)
X WORKSHOP NAME	(3) Last calibration record
XHR /224929885822 0 0 X 04/05/2016	(4) Current vehicle information
ΛVI N3543988939000 R /REG12345	(5) Stored Events
! II 16/07/2014 06: 56 ! 003 00h00	
! HΛ 19/08/2014 06: 45 ! 006 65h07	
!Σ 21/08/2014 23:53 !008 00h00	
! T 21/08/2014 23: 53 ! 009 00h06	(6) Stored Faults
;T 21/08/2014 23:53 ! 053 00h06	(7) Controller place
	(8) Controller's signature
B•	(9) Driver's signature
B	
Δ	

3.2.3 Vehicle Unit Daily Activities

Daily activities stored in the vehicle unit are printed in this report.

AUTOTEST AUTOMONITOR v1.0	
	(1) Printout date/time
K 22/08/2014 10: 14 (UTC)	(T) Finitout date/time
24hлK	(2) Type of print report
Δ Mi cheal Paul ΔHR /CD154586645 0 0	(3) Currently inserted card
Δ 17/03/2016 ΛΛ ΛVI N3543988939000	(4) Vehicle information
R /REG12345 B	(5) Manufacturer Information
AUTOTEST AUTOMONI TOR XX X WORKSHOP NAME XHR /224929885822 0 0	 (6) Recent calibration workshop info. Workshop name, card id & card expiry (7) Last control information
X 04/05/2016 BB BHR /329233939442 0 0	(8) Date and odometer of the day
B 08/07/2014 03: 13 HY Δ 22/08/2014 1221 1222 km	(9) Activities of Slot 1
Δ R /REG1234 44888 km	(10) Rest activity start time, end time and duration. $\Delta\Delta$ Crew mode * rest period >= 1 hour
Φ 00: 22 05: 40 05h18 ΔΔ *	(11) Activities of Slot 2
3 Λ R /REG1234 44888 km Φ 00: 22 05: 40 05b18 AA *	
Ψ 00. 22 00. 40 001110 $\Delta\Delta$	

3.2.4 Vehicle Unit Events

Events and faults stored in the vehicle unit are printed in this report.

AUTOTEST AUTOMONITOR v1.0	
K 22/08/2014 10:14 (UTC)	(1) Printout date/time
КК ! ;ЛК	(2) Type of report
Δ Mi cheal Paul	(3) Current card holder's information
ΔHR /CD154586645 0 0 Δ 17/03/2016	(4) Vehicle information
AVI N3543988939000	(5) events from VU
νις γκεσι2345 !Λ	(6) event type, purpose, date and time
! ΔH(0) 17/09/2014 06: 32 (1) 00h00	(7) event code, no. of similar events, duration of the event(8) faults from VU
·;Λ	(9) fault type, purpose, date and time
;H(3) 05/09/2014 16:17	(10) similar events, duration of the fault
H	(11) on-going faults and events
;K(1) 30/07/2014 10:16 (1) 01h14	
H	(12) Controller place
B•	(13) Controller's signature
B	(14) Driver's signature
Δ	

3.2.5 Technical Report

The tachograph calibration report includes details of the previous calibration. Records of date/time changes are also displayed in the technical report.

AUTOTEST AUTOMONITOR v1.0	
K 22/08/2014 10:14 (UTC)	(1) Printout date/time
КК ХІК	(2) Type of printout indicating technical report
Δ Mi cheal Paul	(3) Current cards inserted in the tachograph
ΔHR /CD154586645 0 0 Δ 17/03/2016	(4) Vehicle information where report is generated
AVI N3543988939000 R /REG12345 	(5) Company information
au12-345 1234567890 8040 ff 15 2014	(6) Motion sensor information
V 2014/08/11	(7) Calibration record details
TT	(8) Workshop card used to perform calibration
1 1234367835 X X AutoTest Workshop XHR /224929885822 0 0 X 04/05/2016 X27/08/2014 (2) AVI N200123456 ANSW /REG200123456 w 9100 Imp/km k 9100 Imp/km I 3145 mm Δ315/80 R22.5 :100 000 - 100 km I	(9) Date of calibration vehicle information w = coefficient of vehicle k = constant of recording equipment I = effective circumference of tyres Δ = tyre type, radius of the tyres >100 = maximum speed limit = 100 kph old and new odometer readings (10) Time adjustment records
<pre>!I 27/08/2014 01:10 I 27/08/2014 01:30 XAutoTest Workshop 61-63 Parsons St, Kensington, Vic 3031 XHWLD /28376419 !;Λ ! 16/09/2014 03:10 ;16/09/2014 03:10</pre>	(11) Most recent event and fault recorded

3.2.6 Over-speeding Report

Over-speeding report contains the recorded events of over-speeding by drivers. The report contains all the major and recent over-speeding events. Each over-speeding event contains the time of the event, max. speed, average speed, duration of speeding, and the ID of the driver involved in over-speeding.

AUTOTEST AUTOMONITOR v1.0	
K 22/08/2014 10: 14 (UTC) K ::K 100 km/h	(1) Printout date/time(2) Report type and max. speed limit set(3) Currently inserted card
Δ Eul er Leonhard ΔHR /CD253586645 0 0 Δ 26/06/2015	(4) Current vehicle identification
A VI N200123456 NSW /REG200123456	(5) Speeding control information
B20/04/2014 14: 20 >> 17/05/2014 07: 50 (001)	(6) First over-speeding after last calibration(7) date, time, duration of over-speeding(8) max. speed, average speed, no. of similar events
>> 27/08/2014 03:25 00h00 120 km/h 112 km/h (0) XHWLD /WS7641900000 0 0	(9) over-speeding driver's card id(10) five most serious over speeding events over the last
::(365) >>27/08/2014 03:25 00h00 120 km/h 112 km/h (000) XHWLD /WS7641900000 0 0	(11) five most serious over speeding events over the last 10
::(10) >>27/08/2014 05:35 00h00 121 km/h 121 km/h (000) XHWLD /WS7641900000 0 0	(12) Control place (13) Controller's signature
BP	(14) Driver's signature
B	
Δ	

3.3 Rollover Detection

The Auto*Monitor*'s rollover sensor constantly monitors vehicle's orientation and motion and can sense the likelihood of vehicle rollover. The factors that aid in rolling over of a vehicle are its tilt angle across its roll axis of rotation and the lateral force exerted by the acceleration of the vehicle around curves and corners. The rollover parameters are calculated based on the dimensions of a vehicle. A vehicle, whose centre of gravity (c.g.) height is low, will require more lateral acceleration to make it roll over, whereas a vehicle with higher centre of gravity (c.g.) height can easily roll over in the event of lower lateral force.

The lateral force can be exerted on a vehicle when the vehicle travels around a bend. The higher the speed of the vehicle around a bend, the greater the lateral force will be. AutoMonitor constantly monitors the changes in lateral force and compares it to the maximum force the vehicle can sustain before becoming unstable. When the AutoMonitor predicts the rollover tendency of the vehicle is approaching the critical value, a warning sound will be produced and the warning lights on the driver's aid module will illuminate. When the driver experiences the rollover alarm, the driver should immediately slow down the vehicle until the rollover warning is gone and the vehicle becomes safe.

3.3.1 Vehicle Profile

The vehicle parameters required by AutoMonitor to predict an impending rollover situation are illustrated in the following diagram.



Figure 16: Vehicle rollover sensing parameters

W	Total width of the vehicle
Н	Total height of the vehicle
L	Total length of the vehicle
hcg	Centre of gravity height
Wt	Track width
ht	Tyre height
h₅	Suspended height
Cg 🏶	Centre of gravity
Table 40. V	labiala valatad vallavav aavaluu vavavatava

 Table 10: Vehicle related rollover sensing parameters

As the weight of the vehicle is increased, the centre of gravity height (h_{cg}) rises. The higher the height of the Cg point, the more the vehicle's stability will be sensitive to the lateral force. The centre of gravity point is calculated from the current mass of the vehicle, the gross mass limit and the tare mass.

Weight Type	Description
Gross Weight	Total weight of the vehicle when fully loaded
Tare Weight	Total weight of the vehicle when not loaded (empty)
Current Mass	Current mass of the vehicle
	Table 11: Vehicle mass related parameters

There are three configurable methods used by the AutoMonitor to calculate the centre of gravity height of the vehicle.

C.g. Calc. Method	Description
Mixed Freight	It is assumed that 70% of the payload is located at the bottom half of the vehicle, and 30% of the payload is located in the top half. The maximum height of c.g. point is therefore around 40% of the maximum height of the payload.
Uniform Density	The height of the c.g. point rises linearly with payload. The maximum height of the c.g. point is reached to the maximum height of the vehicle when the payload is at maximum.
Fixed c.g. height	The c.g. point defined by the user and always remains constant. Changes in vehicle mass will not change the value of c.g. height.
	Table 12: Centre of gravity point calculation methods

3.3.2 Threshold levels

There are two trigger levels used by the rollover detection system. Whenever a trigger level is reached, the rollover detection system will raise an alarm to warn the driver about the likeliness of the vehicle getting rolled over.

3.3.2.1 Warning Level

A warning message is raised when the vehicle's likelihood of getting rolled over is between 40 % to 60 %. When the warning alarm is raised, the driver aid will illuminate amber light. If audio alerts are enabled in the settings, the AutoMonitor will sound a warning tone. Once the warning level is observed by the driver, the driver should immediately slow down the vehicle's speed until the green light is illuminated indicating the vehicle is now safe.

3.3.2.2 Critical Level

A critical alert is raised when the likelihood of a vehicle getting rolled over is above 60%. The red light on the driver's aid unit will be illuminated when the rollover state of the vehicle has reached critical level. A critical audio tone will sound if audio alerts are enabled in the settings. The driver should immediately slow down the vehicle if the critical alert is raised.

3.3.3 Driver Aid

The driver aid module helps drivers by warning them about the likelihood of vehicle getting rolled over. The driver aid module contains three lights, where the description of each is listed in

Table 13.



Figure 17: Driver's aid module to warn about impending rollover

Light	Description	Audio Tone (if enabled)
Green	Rollover state is safe	-
Amber	Warning level is reached	Warning tone
Red	Critical level is reached	Critical alert tone

Table 13: Description of lights in driver aid module

When the rollover sensor is not connected or does not function properly, the three lights of the rollover will start scrolling at a fast rate to indicate a problem with the rollover sensing system.

3.4 GPS Tracker

The GPS based vehicle tracking system incorporates a GPS module and GSM/GPRS modem. A vehicle's location is determined by using GPS satellites and the location is then provided to the control centre in real-time. The status of the GPS module is displayed on the bottom of the screen. Table 14 lists the operational states of the GPS module.

Symbol	Description
酒	GPS Module Error
⊡	Acquiring GPS satellites (locating position)
	GPS running OK.

Table 14: GPS status icon description

If the status of the GPS module remains in 'Acquiring' () for over 5 minutes, check the GPS antenna connectivity. Depending on the strength of the GPS signal, under normal conditions, the AutoMonitor should be able to acquire position in less than 3 minutes. Once the GPS module has acquired position, the state of the GPS module will be changed to .

GPS based tracking system requires a SIM card to connect to the Internet in order to provide vehicle status updates to the control centre.

The GPS tracker can store a maximum of 10,000 track points in the internal memory. When the maximum number of track points is reached, the device will overwrite the oldest track points. All recorded track points can be downloaded to PC using the AutoMonitor Tachograph software.

3.4.1 Geo-Fencing

The Geo-Fencing feature allows a company using the AutoMonitor to restrict the vehicle to be within a defined perimeter or zone. If the vehicle is driven outside its designated zone, AutoMonitor will automatically raise notification alarms to notify the owner or vehicle management via email and/or SMS. When SMS/Email message for geo-fence exceedance is sent, the current GPS location coordinate is also sent with the message. If the geo-fencing notification is disabled, AutoMonitor will not send email or SMS messages.

The geographic fence can be defined using the AutoMonitor Tracker application. To define the zone, the user should first select the centre coordinates of the zone using the mapping interface and then select an appropriate radius of the zone circle. The following screenshot displays the geo-fence as a large circle in red colour.



Figure 18: AutoMonitor tracker - geo fencing

Geo-fencing feature can be enabled or disabled by selecting the device and clicking on the device configuration icon. To view the centre point of a geo-fence, click on 'View' link. A new geo-fence range can be defined on a map screen by selecting 'Use current map point' and entering the desired radius value geo-fence circle.

-Geo Fencing-		1.6
🔽 Enable Ge	ofencing	View
Latitude:	-37.8311700	•
Longitude:	144.9455100	•
Radius:	20.00	km
	Use current map point	

3.5 Vehicle Health Monitoring

AutoMonitor monitors various aspects of the vehicles performances via the On Board Diagnostic (OBD II) protocol. Additionally, the device monitors the brake performance and the performance of shock absorbers via the sensors already contained in the rollover sensor module. Depending on the user requirements, the application software can be upgraded to monitor, log and display additional parameters related engine and emission control.

3.5.1 Vehicle Service Log

AutoMonitor can be used to keep a history of vehicle servicing performed by mechanics. The advantage of service history allows vehicle mechanics to observe which maintenance on the vehicle has already been performed in the past. The service history can be downloaded to a PC when downloading health records.

Inspection type	Accessories to test
1. Minor inspection	Lights, windows, wipers, mirrors, seat belts, hoses, horn, fuel level
2. Basic oil change	engine oil level, radiator level, fluid leaks
3. Major service	air conditioner, transmission level, radiator, alternator

For each of the inspection records, the AutoMonitor will record information such as the time of service, the odometer of the vehicle, type of service and any DTCs currently registered by the vehicle engine.

3.5.2 Brake Performance

A decelerometer sensor is used to sense deceleration or braking events. Brake performance values will only be calculated for an event that lasts longer than 0.33 seconds, otherwise the braking event is considered momentary braking, which is not sufficient for the determination of a valid brake test. The device also considers the maximum deceleration value, which should be above 0.35 g for a valid brake test. Once a valid brake test is detected, the device will perform calculation to determine maximum deceleration, average deceleration, MFDD, and rating.

3.5.3 Shock Absorber Performance

Vehicle movement of the vehicle introduces oscillation in the vehicle suspension system. The rate at which the suspension oscillations converge to idle is called damping ratio. For a well-functioning suspension system, the damping ratio should be above 30%. The calculated shock absorber readings are logged by the system and the data can be transferred to the PC.

3.5.4 On-Board Diagnostic (OBD II)

The on-Board diagnostic codes stored in the Engine Control Unit (ECU) are retrieved by AutoMonitor system via CAN bus that gets shared with the ECU of the vehicle. The diagnostic trouble codes (DTCs) are recorded codes of the problems experienced the vehicle.

3.5.5 Engine parameters (optional)

Depending on the user requirements, the device can be revised to read additional parameter information via the CAN bus interface.

3.5.6 Emission related parameters (optional)

Depending on the user requirements, the device can be revised to read emissions related parameters via the CAN Bus.

4. CONFIGURATION

The device configurations cannot be adjusted while the vehicle is moving. To access settings menu, make sure the vehicle is stationary.

4.1 Display

LCD display brightness and contrast values can be adjusted via the configuration menu. To adjust display related settings, perform the following operations:

Press Menu button (\checkmark) and scroll to the Setting menu and then press OK, use \Leftrightarrow and \Rightarrow keys to scroll through the menu. When Display menu appears, press OK. Device will prompt the user to set contrast value. Brightness menu can be accessed by pressing OK key from the contrast menu. To return back to main screen press return key (\checkmark).

4.2 Audio

Audio settings allow user to turn On or Off rollover alarm sound during a rollover event. The audio settings can be accessed via Settings menu then Audio menu. If the rollover warning of the AutoMonitor is set to MUTE, the LED lights in the driver's aid could be used to detect rollover warnings.

4.3 Date Time

The date and time menu allows users to configure time-zone. If OK key is pressed during the timezone screen, device will display current date and time that is adjusted by the currently set timezone.

4.4 Daylight saving

Daylight saving time can be set using Settings->Daylight menu. If the daylight saving is active during summer, set DST to ON and press OK.

4.5 Unit

Measurement units can be switched been Metric (default) and Imperial. At the moment, only metric units are supported by the device.

4.6 Language

Language menu allows user to change language interface of the device. Presently, only English language is supported by the AutoMonitor's user interface.

5. PC SOFTWARE

5.1 System Requirements

AutoMonitor PC software is based on Microsoft Windows operating system. Additionally, the software requires .NET framework v 3.5 SP2. An Internet connection is also required to remotely track vehicles and observe real-time status of the vehicle on a PC. The minimum hardware specifications are listed below:

- Intel Processor 1.8 GHz
- 2 GB RAM
- 10 GB Hard Disk
- Windows XP or above

5.2 Installation

An AutoMonitor PC software CD is required for installation. The installation program should start up automatically once the software CD is inserted into the PC. If the installation program does not start automatically, the setup program can be run by browsing to the CD/DVD directory and the executing 'Setup.exe' file.

5.3 Software Usage

5.3.1 Tachograph downloader

Activities stored in the tachograph can be downloaded to computer via a serial cable. To establish a connection between the device and the PC, connect one end of the provided serial communication cable to the AutoMonitor's downloading port, and connect the other end of the serial cable to a PC. If the PC does not have a serial port (RS232), a serial-to-USB converter cable will be required. Once the cable is connected, run the tachograph downloader application on the PC and select the serial port and desired baudrate.

UTOr	nonitor ^{Digital Tachogr}
plete Vehicle Condition Mon	itoring
	ATCAND SOL
avan a	
Download	
Select Connection	
Serial Port:	COM16 Connect
Baudrate:	115200 -
Select data to download	
Overview	- Daily Activities Period
Activities	From
Events and Faults	2014/Sep/16 Tue
Detailed Speed	To
Technical Data	2014/Sep./16 Tue
Card File	
Rollover Events	
GF5 LOg	Status: Disconnected
Vahiola Haatth	

Figure 19: Tachograph connection window

Tachograph module requires sufficient credentials before a downloading operation can be processed. A company card, a workshop card, or a control card must be inserted into the AutoMonitor's co-driver slot when performing any downloading operation. Once a valid card with sufficient privileges is inserted, click on 'Connect' and the PC will try to establish a connection. When a connection is successfully established, the tachograph software will allow the user to select the types of data that the software should download. The following types of data can be downloaded using tachograph downloader software:

- 1. Overview
- 2. Activities (time)
- 3. Events and faults
- 4. Detailed speed
- 5. Technical data
- 6. Card data
- 7. Rollover events
- 8. GPS track log
- 9. Vehicle health

5.3.1.1 Overview Records

An overview record item includes the vehicle identification record, vehicle registration, current time, downloadable period, company locks, control activity data. The overview record is mandatory and it is downloaded every time a downloading session is started.

	nonito	r			Digit	al Tachogra
🤹 🔜 🦉	2×					1
Vehicle Units	REG0123	34 (VIC)				26/08/2
2014 08 14	* Overview					
2014 08 15	Vehicle Registra	tion No (REGO)	Company Looks			1 record
2014 08 17	REG01234 (REGO1234 (VIC) Vehicle Identification No. (VIN): VIN242892		Lock Out	Compa	ny Addres
2014 08 19	Vehicle Identific VIN242992				Bruce	Wille 31 Oky
2014 08 21	Downloadable	Penod				
2014 08 22	25/08/2014 Last Session In	to 26/08/2014 Nomation				
2014 08 23	Date.	26/08/2014 17:34:18 LT				
2014 08 24	Company / Workshop	Paul	*			
2014 08 25		110015/5900250000	Control Activities		_	6 record
2014 08 26	Card No:	Dever Card	Time	Туре	Card No.	Download Begin
2014 08 27	Codriver Slot	No card	13:57:30 LT 13:58:31 LT 14:32:28 LT	VU. CARD VU. CARD	3-3-C12 3-3-C12	13:50:31 LT 14:32:28 LT
			15:16:31 LT	VU, CARD	33C12	15-16:31 LT
2014 08 28			15.35.01 LT	VU VU	3-3C12	15.35.01 LT
2014 09 12			and the second second			
2014 09 12 2014 09 12	÷					
2014 09 12 2014 09 12 (a) (b) (c) (c) (c) (c) (c) (c) (c) (c) (c) (c	ŧ			1		

Figure 20: Vehicle unit overview record window

5.3.1.2 Daily Activities Records

A daily activities record includes the daily driving related activities stored in the vehicle unit (VU) by vehicle users. The download period for daily activities can be specified to the dates for which the daily activities should be retrieved. The daily activity records include driving activities for both slots, card insertion/withdrawal records, daily work begin/end places, and specific condition records.

👻 🛄 🖄 🎯	10	2					v1	
Vehicle Units	REG	01234 (V	VLD)				7/08/20	0:
2014 08 07	Activi	ties			Thursday, 7 Augus	t 2014	Print	
2014 08 08	Driving A	ctivities Card	Insertion/Withdrawal	Places	Specific Condition GPS	Log		
2014 08 10	No	Time	Card Status	Driving	Mode Driver	Codriver	Duration	-
and the second s	1	00-00	Inserted	Single	Driving		00h25	
2014 08 11	2	00.00	Inserted	Single	Sarah	Available	01h04	
	3	00:25	Inserted	Single	Work		00h10	
2014 08 12	4	00:35	Inserted	Single	Driving		00h03	
2014 08 14	5	00:38	Inserted	Single	Work		00h11	
2014 00 14	6	00:49	Not inserted	Single	Rest		00h00	
2014 08 15	7	00:49	Inserted	Single	Work		00h02	
Der Carlos	8	00:51	Inserted	Single	Driving		00h07	
2014 08 17	9	00:58	Inserted	Single	Work		00h03	
	10	01:01	Not inserted	Single	Rest		00h03	
2014 08 19	11	01:04	Not inserted	Single	Rest		00h00	
2014 00 21	12	01:04	Not inserted	Single		Rest	00h00	
2014 08 21	13	01:04	Not inserted	Single	100	Rest	00h00	
2014 08 22	14	01:04	Not inserted	Single	Rest		00h00	
2014 00 22	15	01:04	Not inserted	Single	Work		00h01	
2014 08 23	16	01:04	ivot inserted	Single	111-1	Avaliable	00h39	
	Slot 1	Summary	ivot inserted	aingië	Slot 2 Summary		uun02	-
2014 08 24	E				and a saminary			
	Drivin	g: 02h56	Rest/Break: 16h1	5	Availablity: 22h46	Hest/Break: 00h06		
2014 08 25	Availa	blity: 01h31	Work: 02h10		Work: 00h00	Crew: 0		
i i i i i i i i i i i i i i i i i i i								

Figure 21: Vehicle unit daily activities window

The print link located on the top right corner of the window can be used to generate a printable report of daily activities.

Print Report					- 0 - X
Print.				lose	
Vehicl	e Unit A	ctivity D	ata		
1.4					
Overview	w				
Registration	no:	REGO1234	(VIC)		
VIN:		VIN242992			
Activity Dat	te:	28/08/201	4 00:00:00 GM	т	
Odometer a	at Midnight:	128 km			
Slot 1					
Card Holder	r: Michael, Paul				
Card No:	1-1-CD1545	86645000-0-0 (Driver) Exp: 1	7/03/2016	
Period:	28/08/2014	08:16:12 GMT -	08:16:12 GMT		
Odometer:	128 km (0 k	m)			
Prev Vehick	e: REG200123	456 (NSW) (28/	08/2014 08:14	58 GMT)	
Card Holder	r: Michael, Paul				
Card No:	1-1-CD1545	86645000-0-0 (Driver) Exp: 1	7/03/2016	
Period:	28/08/2014	08:36:17 GMT -	08:37:00 GMT		
Odometer:	128 km (0 k	m)		-	
Arthurbu	E: REGOIZ34 (VIC) (28/08/201	4 08:16:11 GM	Chater	
ACOVICY	Start time	End Time	Duration	Status	
2	00:30	08:36	oohoo	Single	
	08:36	08:36	oonoo	Not inserted	
	08:36	08:36	00n00	Not inserted	
×	08:36	08:37	00n01	single	
	08:37	08:37	0000	Not inserted	
h	08:37	08:37	0000	Not inserted	
H	08:37	08:37	00h00	Single	
Card Holder	r: Michael, Paul	and the second			
Card No:	1-1-CD1545	86645000-0-0 (Driver) Exp: 1	7/03/2016	
Period:	28/08/2014	08:37:44 GMT -	09:04:04 GMT		
Odometer:	128 km - 36	7 km (239 km)	4 00-37-00 CM	*1	
Prev Vehick	e: REG01234 (VIC) (28/08/201	4 08:37:00 GM	1)	
ACOVICY	start time	end time	Duration	Status	

Figure 22: Vehicle unit daily activities report

5.3.1.3 Events and Faults

Event and fault records are the recorded events stored in VU every time a fault or an event is detected by AutoMonitor. The currently marked or on-going events and faults are also downloaded when transferring events/faults to PC. The types of records include any event, faults, speed control record, over-speeding records, and time adjustment records.

		on	itor			Digital	Tachogra v	apl 1.0
Vehicle Units		F	REG01234 (W	LD)			7/08/20	01
2	014 08 07	^ Ev	ents and Fau	lts		E	hint	
2	014 08 08	Eve	nts Faults Speed 0	Control Overspeed Time Adjust	ment Rollover Events			
1000 2	014 08 10	Ev	ent Type	Event Purpose	Start Time	End Time	Driver S	1.
en t	014 00 10	Un	saved last session	one of the 10 most recent (or	7/08/2014 15:54:41	7/08/2014 16:11	1-1-CD1	1
2	014 08 11	Ur	saved last session	one of the 10 most recent (or	7/08/2014 17:04:14	7/08/2014 17:20	1-1-CD1	
		Un	saved last session	one of the 10 most recent (or	7/08/2014 17:20:37	7/08/2014 17:32	1-1-CD1	
2	014 08 12	Un	saved last session	one of the 10 most recent (or	7/08/2014 17:32:50	7/08/2014 17:44	1-1-CD1	. 1
-		Un	saved last session	one of the 10 most recent (or	7/08/2014 17:44:34	7/08/2014 17:48	1-1-CD1	
2	014 08 14	Ur	saved last session	one of the 10 most recent (or	7/08/2014 17:48:25	7/08/2014 17:53	1-1-CD1	- 1
100	014 00 15	Un	saved last session	one of the 10 most recent (or	6/08/2014 18:07:34	6/08/2014 18:08	1-1-698	
	014 08 15	Un	saved last session	one of the 10 most recent (or	6/08/2014 18:08:04	6/08/2014 18:08	1-1-698	
2	014 08 17	Ur	isaved last session	one of the 10 most recent (or	6/08/2014 18:08:22	6/08/2014 18:08	1-1-698	
berr at		Ur	isaved last session	one of the 10 most recent (or	6/08/2014 18:09:02	6/08/2014 18:24	1-1-CD1	
2	014 08 19	In	valid card	one of the 10 most recent (or	17/07/2014 09:52:3	17/07/2014 09:5	3-3-000	
		Inv	ralid card	one of the 10 most recent (or	18/07/2014 11:39:3	18/07/2014 15:3	Empty	
2	014 08 21	Inv	ralid card	one of the 10 most recent (or	18/07/2014 16:01:2	18/07/2014 16:1	Empty	
		In	ralid card	one of the 10 most recent (or	31/07/2014 10:25:2	31/07/2014 11:2	Empty	
2	014 08 22	In	ralid card	one of the 10 most recent (or	6/08/2014 18:07:24	6/08/2014 18:08	Empty	
in the second se		Dri	ving without approp	the longest event for one of t	18/07/2014 13:50:3	18/07/2014 13:5	Empty	
2	014 08 23	Dr	ving without approp	the longest event for one of t	29/07/2014 13:59:5	29/07/2014 14:0	Empty	
-	014 00 04	Dr	ving without approp	the longest event for one of t	31/07/2014 11:32:5	31/07/2014 11:3	Empty	
	014 00 24	Dri	ving without approp	the longest event for one of t	1/08/2014 13:05:43	1/08/2014 13:05	4-4-CR	
- 100	014 08 25	Dri	ving without approp	the longest event for one of t	//08/2014 09:37:37	//U8/2014 09:59	Empty	
	014 00 20	Dri	ving without approp	the longest event for one of t	//08/2014 11:46:01	//08/2014 13:00	Empty	
	014 08 26	Dri	ving without approp	the longest event for one of t	17/07/2014 10:18:4	17/07/2014 10:1	Empty	
		-		III				
2	014 08 27	-						_

Figure 23: Vehicle unit event records

AUTO mo	oni	tor			Digital Tacho	graph
	V	0				v1.0
Vehicle Units	REG	601234 (WLD)			7/08	/2014
2014 08 07	Even	ts and Faults			Print	
2014 08 08	Events	Faults Speed Control Overspeed	Time Adjustment	Rollover Events		
2014 08 10	Code	Fault Type	Purpose	Begin Time	End Time	Driver
2014 08 11	0x85	Rollover Sensor Error Bollover Sensor Error	one of the 10 mos	5/08/2014 11:16:07	5/08/2014 11:19	1-1-0
2014 08 12	0x85	Rollover Sensor Error Bollover Sensor Error	one of the 10 mos	5/08/2014 11:21:05 5/08/2014 11:21:28	5/08/2014 11:21	1-1-0
2014 08 14	0x85	Rollover Sensor Error Rollover Sensor Error	one of the 10 mos	5/08/2014 11:25:19	5/08/2014 11:26	1-1-0
2014 08 15	0x85	Rollover Sensor Error Rollover Sensor Error	one of the 10 mos	5/08/2014 11:26:47 5/08/2014 11:27:08	5/08/2014 11:26	1-1-0
2014 08 17	0x85	Rollover Sensor Error Pollover Sensor Error	one of the 10 mos	5/08/2014 11:27:29	5/08/2014 11:27	1-1-0
2014 08 19	0x31	VU: Internal fault	an active/on-goin	8/08/2014 08:52:35 8/08/2014 08:52:35	8/08/2014 08:52 8/08/2014 08:52	1-1-0
2014 08 21	0x32 0x35	VU: Printer Tault VU: Sensor Fault	an active/on-goin an active/on-goin	8/08/2014 08:52:35	8/08/2014 08:52	1-1-0
2014 08 22						
2014 08 23						
2014 08 24						
2014 08 25						
2014 08 26	4	1	111 N		1	6
2014 08 27		Transfer & Fernite Law	3	1	1	

Figure 24: Vehicle unit fault records

	on	itc	or					Digi	tal Tach	ograpi
		2								v1.0
Vehicle Units	RE	G012	34 (WLD)					7/08	3/201
2014 08 07	* Eve	nts ar	d Faults						Print	
2014 08 08	Event	Faults	Speed Cont	rol Overspeed	Time /	Adjustment Rollover	Events			
2014 08 10	Purpi	se		Begin Time		End Time	Card in	Avg Sp	Max Sp	No. of
and the second sec	them	ost seriou	s event for	30/07/2014 14	43:5	30/07/2014 14:4	1-1-CD1	128 kph	130 kph	1
2014 08 11	one	f the 10 m	nost recent	1/01/1970 11:0	0:00	1/01/1970 11:00	Empty	0 kph	0 kph	0
	one o	f the 10 m	nost recent	1/01/1970 11:0	0:00	1/01/1970 11:00	Empty	0 kph	0 kph	0
2014 08 12	one o	f the 10 m	nost recent	1/01/1970 11:0	00:00	1/01/1970 11:00	Empty	0 kph	0 kph	0
2014 00 14	one o	f the 10 m	nost recent	1/01/1970 11:0	00:00	1/01/1970 11:00	Empty	0 kph	0 kph	0
2014 08 14	one o	f the 10 n	nost recent	1/01/1970 11:0	00:01	1/01/1970 11:00	Empty	0 kph	0 kph	0
2014 08 15	one o	f the 10 m	nost recent	1/01/1970 11:0	0:00	1/01/1970 11:00	Empty	0 kph	0 kph	0
	one o	f the 10 m	nost recent	1/01/1970 11:0	0:00	1/01/1970 11:00	Empty	0 kph	0 kph	0
2014 08 17	one o	f the 10 n	nost recent	1/01/1970 11:0	0:00	1/01/1970 11:00	Empty	0 kph	0 kph	0
	oneo	f the 10 n	nost recent	1/01/19/0 11:0	0:00	1/01/19/0 11:00	Empty	Ukph	0 kph	0
2014 08 19	thefi	st event o	or fault hav	30/07/2014 14:	41:0	30/07/2014 14:4	1-1-CD1	110 kph	110 kph	0
	the ti	st event o	ortault nav	30/07/2014 14:	43:5	30/07/2014 14:4	T-HCDT	128 Kpn	130 Kpn	
2014 08 21	one o	fahr 10 m	ilost recent	1/01/1970 11:0	0.00	1/01/1970 11:00	Empty	Olash	Olash	0
2014 09 22	one c	fthe 10 m	nost recent	1/01/1970 11:0	0.00	1/01/1970 11:00	Empty	Okoh	Okoh	0
2014 00 22	one	f the 10 m	nost recent	1/01/1970 11:0	0.00	1/01/1970 11:00	Emoty	0 kph	0 kph	0
2014 08 23							Linpsy	o tipit	o topit	
2014 08 24	E.									
2014 08 25										
2014 08 26	*					m				
2014 08 27			Events	& Faults Details	d Case	d Tashalan Vahia	le Health			

Figure 25: Vehicle unit over-speeding events

5.3.1.4 Detailed speed log

The tachograph constantly records vehicle speed data onto its internal storage memory. The speed of the vehicle is sampled once per second over the past 24 hours. The following screenshot displays how a detailed speed log downloaded from the vehicle unit.

AUTOM Complete Vehicle Condition Monitoring	onit	or		Digital	Tachograph v1.08
Vehicle Units	REGO)1234 (WLD)		14/08/20
2014 08 11	Detail	ed Speed		E	xport
2014 08 12	No	Date	Time	Sneed Block	
2014 08 14	17	14/08/2014	18:34:00 LT 18:33:00 LT	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	1
2014 08 15	19	14/08/2014	18:32:00 LT	59, 59, 59, 60, 60, 60, 59, 59, 59, 60, 60, 60, 60, 60, 60,	
2014 08 17	20	14/08/2014	18:29:59 LT	67, 67, 67, 67, 67, 66, 66, 66, 66, 67, 67	
2014 08 19	22 23	14/08/2014 14/08/2014	18:28:59 LT 18:27:59 LT	0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	
2014 08 21	24 25	14/08/2014 14/08/2014	18:26:59 LT 18:26:00 LT	88, 88, 87, 87, 87, 86, 86, 85, 85, 84, 84, 84, 83, 83, 83, 82, 82, 82, 82, 82, 82, 82, 82, 82, 82,	
2014 08 22	26	14/08/2014	18:25:00 LT 18:24:00 LT	80, 79, 78, 77, 76, 76, 76, 76, 77, 78, 79, 80, 80, 81, 81, 87, 87, 88, 88, 88, 87, 87, 86, 86, 85, 84, 84, 84, 84, 84	
2014 08 23	28	14/08/2014	18:23:00 LT	90, 90, 90, 89, 88, 88, 87, 87, 86, 86, 86, 84, 84, 84, 84,	
2014 08 24	30	14/08/2014	18:21:00 LT	76, 76, 75, 75, 75, 75, 74, 74, 73, 73, 73, 73, 73, 74, 74, 44, 42, 42, 43, 44, 45, 47, 47, 50, 51, 51, 51, 50, 49, 48	
2014 08 25	32	14/08/2014	18:18:59 LT	25, 27, 30, 32, 34, 36, 37, 39, 41, 42, 44, 45, 48, 49, 49, 42, 41, 41, 39, 35, 32, 30, 28, 26, 23, 22, 20, 21, 21, 21, 21	
2014 08 26	34	14/08/2014	18:16:59 LT	72, 73, 74, 74, 75, 75, 74, 72, 72, 72, 71, 71, 71, 70, 70,	
2014 08 27	30	14/08/2014	10.10.09 LT	04, 00, 00, 02, 02, 02, 01, 01, 01, 02, 03, 00, 00, 07, 08, 	
2014 08 28			man	Why May and	
2014 09 12		he Min		M. W. M.	Ţ.
		Anna le s			

Figure 26: Vehicle unit detailed speed records

5.3.1.5 Technical Data

Technical data includes the past calibration history. The previously configured calibration data related to tachograph application, and the details of the technician are contained in the technical record.

ALTOMO	nitor	-		-					-		Digital	- o Tachogra	x aph
Complete Vehicle Consiston Monitoring												vi	.08
🤹 📰 💐	X												
Vehicle Units	REGO1234 (VIC)											12/09/3	201
2014 08 06 2014 08 10 2014 08 11 2014 08 12 2014 08 12 2014 08 15	Pertinical Data Vehicle Identification Manufacture: AubTest Address 275 Nonemby R 2007. Part No: PART112345 Sendi No: 1234567830481 Veison: 1.00 11/00/2014 Approximation APPR112345	4.21 9 00:00 AM											
2014 08 17	Calibration Records												
2014 08 19 2014 08 21 2014 08 22 2014 08 22 2014 08 22 2014 08 22 2014 08 22 2014 08 25 2014 08 2014	Purpole Vehicle Id Reit Installaton Hert Installaton Hert Installaton VIIIC22932 Hert Installaton VIIIC22932 Hert Installaton VIIIC22932	Vehicle Reg RESO1234 (VIC) RESO1234 (VIC) RESO1234 (VIC) RESO1234 (VIC)	Wohahop Name Aato Ten Works Aato Ten Works Aato Ten Works Aato Ten Works Aato Ten Works	Workshop Address 252 Local St, Mei 252 Local St, Mei 252 Local St, Mei 252 Local St, Mei 252 Local St, Mei	Wokuh 23-283 22-283 22-283 22-283 22-283	Woskuh. 1/11/2. 1/11/2 1/11/2 1/11/2	w Const. 9100 9100 9100 9100 9100	k Const 9100 9100 9100 9100 9100	1 Constant, 3145 3145 3145 3145 3145	Tyre Size 315/80 315/80 315/80 315/80 315/80	Authons 100 kph 100 kph 100 kph 100 kph	Old Odo 00 km 00 km 00 km 00 km	Ne 10 10 10
 E REG0123456 REG0987654321 													
	Overview Activities Events & Faults	Detailed Speed Tech	wucal Vehicle Heath	1									-

Figure 27: Vehicle unit calibration of tachograph related technical data

5.3.1.6 Card Data

Card data includes the data stored in the smartcard placed in one of the slots of the tachograph. If there are two cards currently inserted in the tachograph then the card that is currently placed in the driver slot will be uploaded to PC. All activities stored in the card will be transferred to PC.

AUTOm	oni	tor					Digital Tao	chog
omplete Vehicle Condition Monitoring								1
🛃 🛄 🖉		2						
Cards Explorer	Euler	, Leonhar	d					
	DriverC	ard						Pri
2013 11 21	Activ	itios						
2013 11 27	Activ	lues						
	No	Date	Time	Presence Cou	unter	Distance	Activities	
2014 03 02	1	3/03/2014	18:57:58 G	5		0 km	6	
2014 02 02	2	16/07/2014	01:09:57 G	6		0 km	5	
2014 03 03	3	17/07/2014	00:28:18 G	7		0 km	13	
2014 07 16	4	18/07/2014	03:50:56 G	8		0 km	14	
	6	5/08/2014	00:00:00 G	10		0 km	4	
2014 07 18	Dat	ailod Acti	vity	Drivina: 00h2	7	Rest/Break: 22h55	Work: 00h37	_
2014 08 05	4/08/	2014 5:39:16 PI	4	Availablity: 00	0600	Unknown: 00h00		
Laplace, Simon (698)	No	Time	Card Status	Driving Mode	Driver	Codriver	Duration	_
	1	00:00	Not inserted	Single	Rest		08h14	
Michael, Paul (CD15-	2	08:14	Inserted	Single	Driving		00h26	
1 1	3	08:40	Inserted	Single	Work		00h01	
Michael, Paul (CD15)	4	08:41	Not inserted	Single	Rest		14h41	
Workshop Cards	5	23:22	Inserted	Single	Driving		00h01	
Tronce top cords	6	23:23	inserted	Single	Work		00h36	
Galleo, Galilei (28376		23:09	wot inserted	angie	Hest			
Galleo, Gallei (28376								
Galleo, Galilei (WS7(
2014 08 27	-							_

Figure 28: Driver activities stored on driver card

	oni	tor			Digital	Fachogi	apt
Cards Explorer	Euler	, Leonhard					1.0
2013 11 21	DriverC	ard				Pri	nt Re
2013 11 27	Vehic	les Used					
2010 11 27	No	Vehicle	First Use	Last Use	Start O	End O	VL
2014 03 03 2014 07 16 2014 07 17 2014 07 17 2014 07 18 2014 07 18 2014 08 05 Cards Cards	2 3 4 5	REG01234 (WLD) REG01234 (WLD) REG01234 (WLD) REG01234 (WLD)	4/08/2014 07:5:20 GMT 4/08/2014 08:23 GMT 4/08/2014 23:21:49 GMT 5/08/2014 23:21:49 GMT 5/08/2014 00:00:00 GMT	4/08/2014 07:53:20 GMT 4/08/2014 04:143 GMT 4/08/2014 23:59:59 GMT 5/08/2014 01:07:59 GMT	1,000 km 1,000 km 1,280 km 1,280 km	1.000 km 1.280 km 1.280 km 1.280 km	94 95 96 98
Galleo, Gallei (WS7(_			m				
2014 08 27					1		-

Figure 29: Vehicles used records stored on a driver card

Print Report								— • ×
Print		Close						
Card Repo	rt							1
Card overvi	ew							
Card Id 1384 (Card No. Issue Date Card Expiry Card Authority	8546) C3698741000000 27/06/2013 07:11 28/06/2015 07:11 ; AutoTest (Rest of	-0-0 :39 GMT :39 GMT the world.)						F
Card Holder	r Detail							
Name E Date of Birth O Language E	uler, Leonhard 6/03/1982 N							
Driving Lice	ence							
Licence No: L1 Authority: Au	23456 itoTest(Rest of the v	vorki.)						
Vehicles Us	ed							
No Vehicle First	st Use	Vehicle Last Use	Odometer Begin	Odometer End	Distance (km)	Registration No	VU Block counter	
1 4/08/2014	107:51:08 GMT	4/08/2014 07:51:08 GMT	1,000 km	1,000 km	0	REGO1234 (WLD)	93	
2 4/08/2014	07:53:20 GMT	4/08/2014 07:53:20 GMT	1,000 km	1,000 km	0	REGOI234 (WLD)	94	
4/08/2014	1 00:12:33 GMT	4/08/2014 08:41:45 GMT	1,000 km	1,200 km	200	REGO1234 (WLD)	95	
5 5/08/2014	4 00:00:00 GMT	5/08/2014 01:07:59 GMT	1,280 km	1,280 km	0	REG01234 (WLD) REG01234 (WLD)	98	
Activities								
Activities for 3	8/03/2014 18:57:5	8 GMT						
Activity	Start Time	End Time	Duration	Status				
Activity	Start Time 00:00	End Time 19:01	Duration 19h01	Status Not in	erted			
Activity	Start Time 00:00 19:01	End Time 19:01 19:01	Duration 19h01 00h00	Status Not in Sinde	serted			
Activity h O	Start Time 00:00 19:01 19:01	End Time 19:01 19:01 20:13	Duration 19h01 00h00 01h12	Status Not in Single Not in	erted erted			
Activity D O L	Start Time 00:00 19:01 19:01 20:13	End Time 19:01 19:01 20:13 20:13	Duration 19h01 00h00 01h12 00b00	Status Not in Single Not in Single	erted erted			

Figure 30: Driver activities report using data stored on a driver card

5.3.1.7 Rollover events

Rollover events include the recorded history of rollover alerts. Whenever a rollover alert is raised, the vehicle unit will store a record of that along with the GPS location and current speed. Rollover records could be useful in observing hazardous spots of rollover on roads.

	non	itc	or				Di	gital Tac	hogra	aph
🥹 🛄 🛛		R							VI	-08
/ehicle Units	R	EG01	234 (WLI	D)				7,	/08/2	201
2014 08 07	^ Ev	ents a	nd Faults	5				Print	-	
2014 08 08	Eve	nts Fault	s Speed Con	trol Overspeed	Time Adjustment R	ollover Events	_			
2014 08 10	No		Event Type	Start Time	End Time	Start Speed	End Speed	Duratio	Odome	et *
and a second sec	10		Danger	4/08/2014 18:3	. 4/08/2014 18:	44 kph	44 kph	0.089	1239	1
2014 08 11	11		Warning	4/08/2014 18:3	4/08/2014 18:	44 kph	44 kph	0.365	1239	E
	12		Danger	4/08/2014 18:3	. 4/08/2014 18:	42 kph	44 kph	1.066	1239	-
2014 08 12	13		Warning	4/08/2014 18:3	. 4/08/2014 18:	42 kph	42 kph	0.146	1239	
	14		Danger	4/08/2014 18:3	. 4/08/2014 18:	42 kph	42 kph	0.178	1239	
2014 08 14	15		Warning	4/08/2014 18:3	4/08/2014 18:	42 kph	42 kph	0.592	1239	
2014 09 15	16		Danger	4/08/2014 18:3	. 4/08/2014 18:	39 kph	42 kph	0.932	1238	
2014 00 13	17		Warning	4/08/2014 18:3	. 4/08/2014 18:	39 kph	39 kph	0.153	1238	
2014 08 17	18		Danger	4/08/2014 18:3	4/08/2014 18:	39 kph	39 kph	0.437	1238	
a section of the sect	19		Warning	4/08/2014 18:3	4/08/2014 18:	39 kph	39 kph	0.475	1238	
2014 08 19	20		Danger	4/08/2014 18:3	4/08/2014 18:	39 kph	39 kph	0.167	1238	
	21		Warning	4/08/2014 18:3	4/08/2014 18:	39 kph	39 kph	0.346	1238	
2014 08 21	22		Danger	4/08/2014 18:3	. 4/08/2014 18:	39 Kph	39 Kph	0.294	1238	
	23		vvaming	4/08/2014 18:3.	4/08/2014 18:	39 Kpn	39 Kph	0.743	1238	
2014 08 22	24		Wamier	4/08/2014 18:3.	4/08/2014 18: 4/08/2014 18:	39 kph	39 Kpn	0.145	1238	
2014 09 22	20		Danger	4/00/2014 18:3.	A/09/2014 18:	39 koh	39 kph	0.140	1236	
2014 00 23	26		Warning	4/08/2014 18:3.	4/08/2014 18:	40 kph	39 kph	0.100	1230	
2014 08 24	E 28		Danger	4/08/2014 18:3	4/08/2014 18	40 kph	40 kph	0.157	1238	
Contraction of the second seco	29		Waming	4/08/2014 18:3	4/08/2014 18	44 koh	40 koh	0.640	1238	
2014 08 25	20		Dansar	A /00 /001A 10.0	A /00 /0014 10-	AA look	AA look	0.050	1720	*
					10)	1
2014 08 26		wood data	a Show k	lan						
2014 09 27		Suport Odd								_
2014 00 27										

Figure 31: Rollover events downloaded from VU



Figure 32: Display of rollover events on map

5.3.1.8 GPS Track Log

AutoMonitor can hold up to 10,000 track points. When 10,000th track point is reached, the program will replace the oldest records. To download track points, insert a company card into one of the slots of the tachograph and select "GPS Log" from the downloading options in the PC software.

	on	itor						Digit	al Tachograph v1.08
🐓 🎫	>	2							
Vehicle Units	RE	G01234 (VIC)						28/08/201
2014 08 14	Acti	vities			1	Thursday, 28	August 2014	0.1	Print
2014 08 15	Driving	Activities Card	Insertion/Withd	rawal Place	s Specific	c Condition	GPS Log		
2014 08 17	No	Date	Time	Longitu	Latitude	Speed	Elevation	Odometer	4
	22	28/08/2014	19:02:27 LT	144.70	-37.85	25 kph	26 m	366 km	
2014 08 19	23	28/08/2014	19:02:26 LT	144.70	-37.85	25 kph	26 m	366 km	
2014 00 21	24	28/08/2014	19:02:00 LT	144.70	-37.85	56 kph	24 m	364 km	
2014 08 21	25	28/08/2014	19:01:31 LT	144.71	-37.85	64 kph	22 m	357 km	
2014 08 22	26	28/08/2014	19:01:00 LT	144.71	-37.85	46 kph	25 m	351 km	
101 10 10 00 22	27	28/08/2014	19:00:24 LT	144.72	-37.85	55 kph	24 m	342 km	
2014 08 23	28	28/08/2014	19:00:20 LT	144.72	-37.85	53 kph	24 m	342 km	
NAME OF TAXABLE PARTY.	29	28/08/2014	18:59:42 LT	144.72	-37.85	38 kph	23 m	340 km	
2014 08 24	30	28/08/2014	18:59:30 LT	144.72	-37.85	35 kph	23 m	340 km	
The second se	31	28/08/2014	18:59:29 LT	144.72	-37.85	34 kph	23 m	340 km	
2014 08 25	32	28/08/2014	18:59:28 LT	144.72	-37.85	33 kph	23 m	340 km	
2014 09 26	33	28/08/2014	18:59:27 LT	144.72	-37.85	33 kph	23 m	340 km	
UT 4 00 20	34	28/08/2014	18:59:26 LT	144.72	-37.85	32 kph	23 m	340 km	
2014 08 27	35	28/08/2014	18:59:25 LT	144./2	-37.85	32 kph	23 m	340 km	
the second	36	28/08/2014	18:59:00 LT	144.73	-37.85	30 kph	22 m	337 km	
2014 08 28	3/	28/08/2014	18:58:59 LT	144.73	-37.85	30 Kpn	22 m	337 Km	
low read	38	28/08/2014	18:58:22 LT	144.73	-37.85	52 kpn	21 m	328 Km	
2014 09 12	35	20/00/2014	10.37.40 LT	144.74	-37.00	46 kph	20 m	210 km	
	40	28/08/2014	19-56-16 LT	144.74	-37.05	40 Kph	20 m	302 km	
REGO123456	42	28/08/2014	18:55:43 LT	144.76	-37.85	51 kph	17m	294 km	-
REGO987654321		Export to CSV	View in Go	ogle Earth	Show	/ Map		LUTIAN	
					<u></u>				

Figure 33: GPS track log download from VU



Figure 34: Downloaded GPS track log displayed on map

5.3.1.9 Health data

Vehicle's health related data can be downloaded by selecting 'Health data' during downloading. Health data includes vehicle brake performance, suspension performance, vehicle mass profile, diagnostic information, engine parameters.

	mon	itor	-				Dig	ital Tachogi	aph
		2						N	1.08
Vehicle Units	RI	G01234 (\	VIC)					12/09/	201
2014 08 1	4 Vel	nicle Healt	1						
2014 08 1	5 Brake	Performance St	uspension Syst	em Mass E	Engine Diagnostic	Codes OF	BD II Data		
2014 08 1	7 No	Date	Time	Avg. Decel.	Max. Decel.	MFDD	Avg. MFDD	Max. MFDD	+
2014 00 1	1	11/09/2014	18:31:4	0.34	0.47	4.15	3.40	4.15	
2014 08 1	2	10/09/2014	10:00:0	0.34	0.47	4.15	3.40	4.15	
2014 08 2	1 3	10/09/2014	10:00:0	0.34	0.47	4.15	3.40	4.15	
love a	4	10/09/2014	09:59:5	0.34	0.47	4.15	3.40	4.15	
2014 08 2	2 5	9/09/2014	10:00:0	0.34	0.47	4.15	3.40	4.15	
	0	9/09/2014	10:00:0	0.34	0.47	4.15	3.40	4.15	
2014 08 2	3	9/09/2014	10.41.1	0.34	0.47	4.10	3.40	4.10	
2014.00.2		8/09/2014	10-11-5	0.34	0.47	4.10	3.40	4.10	
2014 00 2	10	29/08/2014	10.00.0	0.35	0.45	3.64	3.64	3.64	
2014 08 2	5 11	29/08/2014	10.00.0	0.35	0.45	3.64	3.64	3.64	
200	12	29/08/2014	09:59:5	0.35	0.45	3.64	3.64	3.64	
2014 08 2	6 13	28/08/2014	19:04:0	0.35	0.45	3.64	3.64	3.64	
2014 08 2	7	00 100 1001 4	10.00.0	0.10	Vehicle Brake	4.17	4.47	4.47	
	1	1900							-
2014 08 2	9								1
2014 09 1	1								
Rectard and					10				
B REG0123456	= 8								
REG0987654321			_ III III	U U U U U U U U			IIIIIIIIII		
					Sample				
UNREGISTERED									
- Changel	0	ow Activition A	Fuente & Fault	Detailed Sne	ed Technical	Matriala Lina	lal.		

Figure 35: Vehicle health log download from VU

5.3.2 Real-time GPS Tracking Application

AutoMonitor Tracker software allows vehicle owners to track their vehicle in real-time. The tracking software acts as a server and monitors incoming TCP/IP connections from vehicle units. If a vehicle unit or remote device is configured to remotely connect to the PC where tracking software is running, the remote device will automatically try to establish connection with the PC at configurable periodic times. Once the remote device is connected to the tracking software, the software will plot the device onto a map and will show status information of the vehicle. More detail on the connection settings is described in Section 0.

5.3.3 AutoMonitor Configuration

AutoMonitor configuration software allows various settings to be altered. The software requires a sufficient degree of access level before it allows users to configure changes.

5.3.3.1 Authentication

AutoMonitor Calibrator software can be used with a valid workshop and company cards. When the calibrator software is running in company mode (i.e. using a company card), the software will only provide access to the configuration-related settings, while the calibration-related tools will not be available. The calibrator software provides full access when operating in calibration mode (i.e. using a workshop card).

When the calibrator software is first run, the software will prompt the user to select the communication port to which the device is connected.

	AutoMonitor - Login	X	<u> </u>
hicle Unit	Connection		
	Senal (RS232):		
ial Number:	Com. Port:	COM16 •	
ufacturer Namer	Modem (dial-out):		
ufacturer Addres	Modem:	COM1 T	
ufacturing Date:	Dial out No:	*	
rova) number:	Authentication		
ware identificatio	User	ADMIN	
ware Install Date	Password:	••••	
		Save Password	
		Login Close	

Figure 36: Authentication dialogue for calibrator software

Once the login authentication is successful, the software will retrieve current settings and operational mode.

5.3.3.2 Vehicle model and registration

The vehicle model and registration page allows the description of the vehicle to be set. The serial number and part number of the vehicle unit (VU), the identity of the vehicle, and the model information of the vehicle are configured on this page.

1) 🐔 (🕸 🖨 🕅	w 🧰 🕻	
Vehicle Registra	ation		
Device Serial Number:	1234567890		
Part Number:	PART12345		
Identification No (VIN):	VIN242992		
Registration No (REGO):	REGO1234		N
Registration State:	Victoria (VIC)	÷	63
Make:	Volvo		
Model:	B10BLE		
Year:	2010		
Vehicle Ican:			

Figure 37: Vehicle registration and model type configuration window

The vehicle icon selected will be the icon of the vehicle when it appears on the map of the tracking software.

5.3.3.3 Rollover threshold settings

The rollover threshold setting page allows users to alter settings of the threshold values of the rollover detection and notification system.





5.3.3.4 Connection Setup

The connection setup page allows the user to alter the modem settings Users can configure SMS, Dial-out, GPRS, SMTP, HTTP and Remote services.

		WWW BUNG	
Nodem			
Modem Information			
IMEI:	35,000,000,000,000,000,000,000,000,000,0		
Version No:	R7.45		
Status:	INACTIVE		
Signal Level:	0 %		
Configuration			
SMS GPRS SM	TP HTTP Post Remote	Service Dial-out	
Enable SMS not	fications		
SMS From:	04120000000		
SMS Recipient(s):	·	Add to list	
	04120000123	Remove	

Figure 39: Modem configuration window

More detail on the connection configuration is provided in section 0.

5.3.3.5 Notification Setup

The notification service allows users to configure AutoMonitor to send out events and faults notifications via emails and SMS. It also allows users to configure schedule for timely reports. More detail on the notification service is provided in section 0.



Figure 40: Events notification selection window

5.3.3.6 General Settings

The general settings page allows users to erase previously stored data and configure general settings of the device.

		-AME AND C	🤍 🕖 🔀
General			
Reset Data		Factory Restore	
 Suspension Me Brake Performa GPS Track 	asurement nce	Factory Reset will format space on the device. Th DELETE ALL DATA and stored on the device!	i storage nis will d SETTINGS
Clear Select	red	Start Factory F	Nestore
General			
Units:	Metric 👻	1	
Timezone:	10.00 👻	Reset Rollover Data	Sensor
Daylight Saving:	Off 👻	1. A.	
Backlight:	100 👻		
Contrast:	9 🗸		
	Store		

Figure 41: Miscellaneous configuration window

5.3.3.7 Vehicle Dimension

The vehicle dimension settings page is used to configure the vehicle profile and it requires calibration level access, which is possible using a workshop card. The dimensions of the vehicle, the type of suspension system of the vehicle, the weight of the vehicle, and the method for estimating the weight of the vehicle are all configurable on this page.

Vehicle Dim	ensions	(100)	-MANT			5
/ehicle Dimension						
Length:	3	m	Track Width:	1.863	m	
Width:	1.87	m	Tyre Height:	0.8	m	
Height:	1	m	Max. Height:	1.483	m	
No of Axles:	2		Chassis Ref.:	70		
C.G. Method:	Mixed Freight	•				
ehicle Mass			Oscillation Frequ	ency:		
Tare Weight:	1700	kg	Max:	3.000	Hz	
Gross Weight:	2500	kg	Min:	0.50	Hz	
Current Mass:	1700	kg	Current:	1.500	Hz	
	Store]				

Figure 42. Vehicle dimension configuration window.

5.3.3.8 Tachograph Calibration

The tachograph calibration page calibrates the tachograph and it requires the calibration level access, which is only possible with a workshop card.

	monito	Dr Calif	v1.08
implete venicle conditi			
) 🔅 (🔊 📻 🔤		
achograph Cal	ibration		
onfiguration Tacho Sens	or Monitor		
Vehicle Id:	VIN242992	_	1
Vehicle Rego:	REG01234		
Calibration Purpose:	First Installation	•	
w - coefficient of vehicle:	9100	Impulse/km	
k - constant of recording equipment:	9100	Impulse/km	
I - tyre circumterence:	3145	mm	
Tyre Size:	315/80 R22.5		
Authorised Speed:	100	km/h	
Odometer New:	730	km	
New Date:	Tuesday , 16 September 2014		
New Time:	11:27:33 AM		
	Store		

Figure 43: Tachograph related calibration window

5.3.3.9 Rollover Sensor

Rollover sensor calibration page is used to calibrate the accelerometer and gyroscope sensors of the rollover sensor module at two temperature points.

		On	non	itor		Calibrat	or
nple	te Vehicle C	ondition Monit	oring			v1.0)8
							X
ollo	ver Ser	sor					
	H (Ded No.)				Sto	ore	
ensor	lumber:						
sildi i	wumber.						
these	ing Data:	25/00/2	MA 7.42.07 MM				
alibrat	ion Date:	25/08/2	2014 7:43:07 AM				
alibrat Roll	ion Date: over Sei	25/08/2 nsor Calib	2014 7:43:07 AM Pration				
alibra Coll Acce	ion Date: over Sei lerometer G	25/08/2 nsor Calib	2014 7:43:07 AM pration	1			
alibrat Coll Acce	ion Date: over Sei lerometer G	25/08/2 nsor Calib	2014 7:43:07 AM pration Acceleromet	er Calibration		_	1
alibrat Coll Acce	ion Date: over Sei lerometer G At Room Te	25/08/2 nsor Calib yroscope	2014 7:43:07 AM pration Acceleromet 33 degC	er Calibration At Second	Femperature	5 degC	
alibra Roll	ion Date: over Sei lerometer G At Room Te <u>Min</u>	25/08/2 nsor Calib vroscope emperature Max	2014 7:43:07 AM Pration Acceleromet 33 degC Offset	er Calibration At Second ⁻ Min	Femperature Max	5 degC Offset	
Acce	ion Date: over Sei lerometer G At Room Te <u>Min</u> -16992	25/08/2 Insor Calib vroscope emperature Max 16504	2014 7:43:07 AM irration Acceleromet 33 degC Offset -286	er Calibration At Second ⁷ <u>Min</u> -16984	Femperature Max 16952	5 degC Offset 4	
Accee X	Ion Date: OVER SEI Ierometer G At Room Te Min -16992 -16784	25/08/2 msor Calib yroscope emperature Max 16504 16992	2014 7:43:07 AM aration Acceleromel 33 degC Offset -286 -57	er Calibration At Second Min -16984 -16856	Femperature Max 16952 16864	5 degC Offset 4	
Accee X Y Z	ion Date: over Sei lerometer At Room Te <u>Min</u> -16992 -16784 -16672	25/08/2 msor Calib mperature Max 16504 16992 16712	2014 7:43:07 AM aration Acceleromet 33 degC Offset -286 -57 0	er Calibration At Second ⁷ <u>Min</u> -16984 -16992	Femperature Max 16952 16864 15656	5 degC Offset 4 -53 0	
Accee X Y Z	ion Date: over Ser lerometer G At Room Te <u>Min</u> -16992 -16784 -16672	25/08/2 msor Calib mperature Max 16504 16992 16712	2014 7:43:07 AM rration Acceleromet 33 degC Offset -296 -57 0	er Calibration At Second ⁻¹ <u>Min</u> -16984 -16856 -16992	Femperature Max 16952 16864 15656	5 degC Offset 4 -53 0	

Figure 44: Rollover sensor calibration window

6. CALIBRATION

6.1 Rollover sensor calibration

There are two sensors contained in the rollover sensor module that require calibration:

- 1. Accelerometer
- 2. Gyroscope

6.1.1 Accelerometer

The accelerometer used in the rollover sensor module is a tri-axial accelerometer and it is calibrated at two temperature points, where the temperature difference between the two points should be over 15 °C. The temperature for the first point can be the room temperature. To calibrate the accelerometer of the rollover sensor module at room temperature, place the rollover module on a level surface and press start. The window will display current temperature value for the first calibration point. After 10 seconds, gently hold the accelerometer and rotate it around all three axes at a very slow speed. The calibrator software will display the calibration values on the screen. Once all three axes have been rotated 360 degrees press stop button.

Rollover Sensor Calibration

	At Room Te	mperature	33 degC	At Second 1	l'emperature	5 degC
	Min	Max	Offset	Min	Max	Offset
(-16992	16504	-286	-16984	16952	4
Y	-16784	16992	-57	-16856	16864	-53
Z	-16672	16712	0	-16992	15656	0

Figure 45: Rollover sensor calibration - accelerometer

To calibrate the second point of the accelerometer, either raise the temperature of the device to about 40 °C or cool it down to about 0 °C. Once the expected temperature of the device is reached, connect the sensor AutoMonitor and place the sensor on a flat surface. Press start button on the accelerometer calibration page when ready and wait for 10 seconds. The temperature value for the second point will be displayed on the PC screen. As with the first point, rotate the rollover sensor module around all three axes. Once all axes have been rotated 360 degrees press stop. The accelerometer is now calibrated.

6.1.2 Gyroscope

The gyroscope used in the rollover sensor is a tri-axial digital gyroscope and requires calibration for all three axes at two temperature points. The first temperature can be the room temperature, while the second temperature can be at about 0 °C.

To calibrate the first point at room temperature, leave the rollover sensor connected in a room for 10 minutes. Place the gyroscope on a plane surface and click on start to start the first point calibration. The rollover sensor should not move during the first 15 seconds. After 15 seconds click on stop.

Accel	lerometer Gy	roscope				
			Gyroscope	e Calibration		
	At Room Te	mperature	33 degC	At Second	Temperature	2 degC
	Min	Max	Offset	Min	Max	Offset
х	-254	253	-12	-253	256	25
Y	-247	253	29	-201	254	59
Ζ	-276	213	-94	-187	298	74
						Start

Figure 46: Rollover sensor calibration - gyroscope

To calibrate the second point of the gyroscope, raise the temperature of the rollover sensor to 40 °C or lower the temperature to about 0 °C. Once the expected temperature is reached, connect the rollover sensor to the vehicle unit and the follow the same steps described earlier for the first temperature point.

6.2 Tachograph Calibration

The tachograph calibration includes the calibration of the wheels and motion sensor, setting up the vehicle identification information, date and time of the device, odometer of the vehicle, and maximum authorised speed for the vehicle.

onfiguration	Tacho Sens	or Monitor	
Vehicle Id:		VIN242992]
Vehicle Re	go:	REGO1234	
Calibration F	urpose:	First Installation 👻]
w - coeffici vehicle:	ent of	9100	Impulse/km
k - constan recording e	t of quipment:	9100	Impulse/km
I - tyre circu	imterence:	3145	mm
Tyre Size:		315/80 R22.5]
Authorised	Speed:	100	km/h
Odometer N	lew:	730	km
New Date:		Tuesday , 16 September 2014 👻]
New Time:		11:31:20 AM]
		Store	

Figure 47: Tachograph calibration window

The coefficient of vehicle (w) indicates the number of pulses required from the motion sensor for the vehicle to travel a distance of one kilometre. The constant of recording equipment (k) indicates the number of pulses obtained from the motion sensor for the vehicle to travel a distance of one kilometre. The tyre circumference (I), given in millimetres mm, is the average circumference of all wheels of the vehicle under normal conditions. The tyre circumference is the distance travelled by the wheel in one wheel rotation. The tyre-size is the size of the tyre marked on the side of the tyre. The authorised speed is the maximum speed permitted for the vehicle. If the vehicle exceeds this maximum authorised speed, the tachograph will register an over-speeding event. The odometer field should have the current odometer readings of the vehicle indicated in the vehicle's dashboard. The 'New Date' field contains the current date that needs to be set in the tachograph. The date and time indicated in the settings window is according to the local time of the PC.

6.3 Motion sensor calibration

The motion sensor calibration is used to validate the speed of the vehicle.

Tachograph Calibration

nitial Reading			Stop
Pulse Counter:	2,114,698	Counts	Clear
Distance:	730,849	m	local
Speed:	0	kph	
	2,114,698	Counts	
Pulse Counter:			
Pulse Counter: Distance:	730,849	m	
Pulse Counter: Distance:	730,849	m	

Figure 48: Motion sensor validation

6.4 Vehicle profile setup

The profile of the vehicle includes the dimensions of the vehicle body, the combined weight of the vehicle, and the properties of the suspension system.



Dimension	Description
W	Width of the vehicle body
L	Length of the vehicle
H _{max}	Maximum height of the body
ht	Height of the tyres
Wt	Track width
h _{cg}	Height, current centre of gravity height

The profile of the vehicle can be entered in the vehicle dimensions form.

Vehicle Dimension					
Length:	3	m	Track Width:	1.863	m
Width:	1.87	m	Tyre Height:	0.8	m
Height:	1	m	Max. Height:	1.483	m
No of Axles:	2		Chassis Ref.:	70	
C.G. Method:	Mixed Freight	•			
Vehicle Mass			Oscillation Frequ	ency:	
Tare Weight:	1700	kg	Max:	3.000	Hz
Gross Weight:	2500	kg	Min:	0.50	Hz
Current Mass:	1700	kg	Current:	1.500	Hz
		1			
	Store				

Vehicle Dimensions

Figure 49: Vehicle profile configuration window

The dimensions of the vehicle are used to sense impending rollover of the vehicle. The suspension properties or oscillation frequency detail is used to estimate the current load of the vehicle. As the load of the vehicle is increased, the centre of gravity point will also increase correspondingly. There are three methods used to estimate the height of the centre of gravity point:

C.g. Calc. Method	Description
Mixed Freight	It is assumed that 70% of the payload is located at the bottom half of the vehicle, and 30% of the payload is located in the top half. The maximum height of c.g. point is therefore around 40% of the maximum height of the payload.
Uniform Density	The height of the c.g. point rises linearly with payload. The maximum height of the c.g. point is reached to the maximum height of the vehicle when the payload is at maximum.
Fixed c.g. height	The c.g. point defined by the user and always remains constant. Changes in vehicle mass will not change the value of c.g. height.
Tab	le 15: Centre of gravity point calculation methods

The reference chassis value is used to calculate the rating of shock absorbers.

6.5 Vehicle mass calibration

The mass calibration of the vehicle requires the vehicle profile data to be already configured.

The calibration of mass is performed by driving the vehicle at two load levels, where the difference between the two loads should be 40% of the maximum payload. The first point can be calibrated when the vehicle is empty, or at 0% of maximum payload. Follow the steps indicated below and set the new mass value to 0%.



Once the new mass is set to zero percent, drive the vehicle over speed breakers a few times to let the AutoMonitor learn the behaviour of suspension system. Set the second calibration point of vehicle mass by adding load into the vehicle. The load added should be over 40% of maximum payload. Once the mass is added and the vehicle is ready to be driven, set the new mass value to the amount of payload just added into the vehicle. Perform another test drive over speed breakers a few times. Once the mass has been calibrated, the real-time mass of the vehicle will be displayed on the screen.

Note: While the mass calibration is being performed and AutoMonitor learns the vehicle's profile, the LCD will display 'c' to indicate mass-calibration mode. While the AutoMonitor is in mass-calibration mode, the vehicle mass value might not update and the rollover alarms might not be accurate until the mass profile has been learnt by the system.

7. SMARTCARD PROGRAMMING

AutoMonitor works with synchronous card such as SLE5528/ISSI4428 memory cards. Each card is formatted according to its card type. There are four primary types of smartcards:

- 1. Driver card
- 2. Company card
- 3. Control card
- 4. Workshop card

The description of these card types has been given in Section 3.1.3.

To create a new smartcard or to edit an existing card, AutoMonitor Card Maker tool is required. Once the card maker software is run, the software will need to connect to AutoMonitor via serial port. Once the software is connected, the details of the currently inserted card will be retrieved. Click on Refresh link to view the card details on the card maker application.

7.1 Driver Card

The driver card contains card identification data, card holder's identification, and driving license number.

	[reserves	_
Card Slot:	1 - Driver Slot	
Card Type:	Driver Card	*
Card Identification		
Card Number:	CD15458664500000	
Issue Date:	Monday . 17 March 2014	
Validity Begin Date:	Monday . 17 March 2014	
Expiry Date:	Thursday , 17 March 2016	•
Card Holder (Driver)		
First Name:	Paul	
Last Name:	Michael	
Language:	English 🔹	
S	Friday , 17 March 2000	•
Date of birth:		

Figure 50: Tachograph card maker - driver card

7.2 Company Card

The company card contains the identification of the card and the details of the company.

Card Slot:	1 - Driver Slot		•
Card Type:	Company Card		•
Card Identification			
Card Number:	CD15458664500000		
Issue Date:	Monday , 17 Man	ch 2014	
Validity Begin Date:	Monday . 17 Man	ch 2014	
Expiry Date:	Thursday . 17 Mar	ch 2016	•
Card Holder (Company)			
Company Name:	AutoTest Products Pty	Ltd	
Company Address:	279 Normanby Road, P	ort Melbo	
Language:	English	-	

Figure 51: Tachograph card maker - company card

7.3 Control Card

The control card contains the identification of the card, the identification of the card holder and the name & address of the control body.

ControlCard		Refre
Card Slot:	1 - Driver Slot	•
Card Type:	Control Card	•
Card Identification		
Card Number:	CD15458664500000	
Issue Date:	Monday , 17 March 2014	
Validity Begin Date:	Monday . 17 March 2014	
Expiry Date:	Thursday , 17 March 2016	•
Card Holder (Control)		
First Name:	Albert	
Last Name:	James	
Language:	English 🔹	
Control Body:	Vic Speed Control	
Control Body Addr:	123 Main Rd, City	

Figure 52: Tachograph card maker - control card

7.4 Workshop Card

The workshop card contains card identification detail, the names of the card holder, and the detail of the workshop.

WorkshopCard		Refresh
Card Slot:	1 - Driver Slot	•
Card Type:	Workshop Card	•
Card Identification		
Card Number:	CD15458664500000	
Issue Date:	Monday . 17 March 2014	
Validity Begin Date:	Monday , 17 March 2014	
Expiry Date:	Thursday , 17 March 2016	
Card Holder (Worksho	p)	
	Ken	
First Name:		
First Name: Last Name:	ü	
Last Name: Last Name: Language:	Li English 🔹	
First Name: Last Name: Language; Workshop Name:	Li English Auto Test Workshop	

Figure 53: Tachograph card maker - workshop card

8. TACHOGRAPH PICTOGRAMS

People

А	Company
В	Controller
Δ	Driver
Х	Workshop/test station
В	Manufacturer

Activities

Е	Available
Δ	Driving
Φ	Rest
Г	Work
6	Break
<	Unknown

Equipment

1	Driver slot
3	Co-Driver Slot
Н	Card
Ι	Clock
θ	Display
К	Printer/Printout
Λ	Vehicle/Vehicle unit

Miscellaneous

0	Start of daily work period
П	End of daily work period
Р	Location
Θ	Security
Ι	Time
4	Daily
5	Weekly
6	Two weeks
7	From/To
РО	Location start of daily work period
ПР	Location end of daily work period
M7	Out of scope begin
7M	Out of scope end

Driving

$\Delta\Delta$	Crew driving
Δ5	Driving time for one week
Δ6	Driving time for two weeks

Cards		
ΔH	Driver card	
AH	Company card	
H888	No card	
1 Δ H888	period without card in slot	
3ΔH888	period without card in slot	

Events

9Н	Insertion of a non-valid card
9HH	Card conflict
9II	Time overlap
9∆Н	Driving without an appropriate card
9HΔ	Card insertion while driving
9НЛ	Last card session not correctly closed
::	Over-speeding
9Σ	Power supply interruption
9T	Motion data error
9Θ	Security breach
9I	Time adjustment (by workshop)
:B	Over-speeding control

Faults

;Н	Card faults
;H1	Card fault (driver slot)
;H3	Card fault (co-driver slot)
<i>;</i> θ;	Display fault
;Y	Downloading fault
;K	Printer fault
;T	Sensor fault
;Λ	AutoMonitor Internal Fault

Additional Pics

ΟΔ	Driving time over daily work period
07	Daily work period amplitude
ΠΦ	Time left to the driver before starting his daily rest period
7H1	Update of data on card 1 before withdrawal
7H3	Update of data on card 2 before withdrawal
ΘA7	Company lock start
70A	Company lock end
ПР<	Confirm/Enter location of end of work period
PO<	Enter location of start of work period

Specific conditions

М	Out of scope
Ν	Ferry/Train crossing

9. LAYOUT OF ELECTRICAL CONNECTORS AND PLUGS

9.1 Standard connectors

Connectors A, B and D located at the rear of the vehicle unit (VU) are the standard tachograph connectors. The description of each connector and the associated pins is provided below:



Connector A – Power supply and CAN bus connection

Pin	Description
A1	Permanent power (Positive +)
A2	Illumination
A3	Ignition
A4	CAN_H
A5	Battery (Negative -)
A6	Ground, GND
A7	CAN_GND
A8	CAN_L

Connector B – Tachograph speed transmitter connection

B1 Positive supply	
B2 Battery (negative -)	
B3 Speed signal, real time	
B4 Data signal	
B5 -	
B6 Speed pulse output	
B7 Speed pulse output	
B8 Distance signal, 4 pulses/m	

Connector D – Optional functions

Pin	Description
D1	Status input 1
D2	Status input 2
D3	-
D4	General tachograph warning output
D5	-
D6	Speed pulse output for instrument
D7	Data communication I/O
D8	-

9.2 Download Port

The downloading connector is located on the front panel near the key buttons. The description of the six pins of the downloading port is given below:



Pin	Description
1	Battery (-)
2	Data communication
	K-line (ISO 14 230-1)
3	RxD – Downloading
4	Input/Output signal - Calibration
5	Permanent power output
6	TxD - Downloading

9.3 Driver's Aid Connector

The driver's aid connector is located at the rear of the vehicle unit (VU). Some of the pins of this connector are connected to the driver's aid box, while other pins are general digital I/O and analog input pins.

12	11	10	9	8	7	
6	5	4	3	2	1	

Pin	Description
1	Digital I/O 1
2	Speaker
3	Red Lamp
4	Green Lamp
5	Amber Lamp
6	Positive (+)
7	GND
8	Analog Input 1
9	Analog Input 2
10	Digital I/O 4
11	Digital I/O 3
12	Digital I/O 2

9.4 Rollover Sensor Connector

The rollover sensor connector is located at the back of the vehicle unit (VU). The rollover sensor module is connected to this port. The description of individual pins of this port is provided below:

12 11 10 9 8 7						
	12	11	10	9	8	7
6 5 4 3 2 1	6	5	4	3	2	1

Pin	Description
1	Sensor Ready
2	Sensor Interrupt
3	-
4	Sensor Off
5	Battery (+)
6	-
7	-
8	-
9	GND
10	GND
11	Data Out
12	Data In

10. PRODUCT SPECIFICATIONS

Tri-axial acceleration resolved to	Forward, Lateral and Vertical vectors	
Maximum angular velocity	± 250 °/s	
Angular velocity accuracy	1 %	
Maximum acceleration	± 2g	
Acceleration accuracy	< 2 %	
GPS receiver type	50 channels	
	GPS L1 frequency, C/A Code	
Horizontal position accuracy	GPS	2.5 m
GPS Time to first fix	Cold start	26 s
	Warm start	26 s
	Hot start	1 s
Frequency response	0 – 5 Hz	
Temperature stability	Internally compensated	
Temp. compensation accuracy	5 %	
Outputs	Speaker: 85 dBA @ 1 m	
Warning lamp	40 mcd	
Danger lamp	70 mcd	
Digital interface	RS232C-standard 9 pin	
GPRS interface	Broadband modem	
Live GPS tracking resolution	2 m	
Historical GPS	Audit trail analysis	
	10,000 track points	
Built-in thermal printer		
Paper width	58 mm	
Paper roll size	Max. \varnothing 32 mm	
Memory retention	5 years	
Radiated RF emissions	SAEJ1113 Class 3	
Compliant with	SAE J1455, ISO 7736	
Operating temperature	-10° to +70°C	
Humidity	Up to 90% non-condensing	
Dimensions (h × d × w)		
Vehicle Unit (VU)	60 mm × 188 mm x 188 mm (Complies with ISO 7736)	
Rollover sensor	60 mm × 135 mm x 80 mm	
Driver's Aid	40 mm × 115 mm x 90 mm	
Supply Voltage	12 – 28 V	
Power consumption	300 mA	(Standby)
•	500 mA	(Typical)
Suspension performance	Damping ratio, overall rating	
Brake Performance	Max. deceleration, avg. deceleration.	
	MFDD	
Detailed speed log	24 hour recording at 1 Hz	

The replacement of any components must be carried out by AutoTest[™] Products or an Authorised AutoTest Products Service Centre.

11. WARRANTY

To ensure prompt warranty service should it be required, please complete warranty registration form, and return to AutoTest Products Pty Ltd within 10 days of purchase of the product. AutoTest Products or an Authorised Service Centre warrants this product against defects in material and workmanship for a period of 12 months from the original date of purchase. This warranty applies only to products and components supplied by AutoTest Products which can be identified by the trade name or logo affixed to them or by other documents. AutoTest™ Products does not warrant any products not supplied by AutoTest Products.

During the warranty period, AutoTest Products or an Authorised Service Centre will repair (or at its option replace), any defective component(s) without charge for labour, provided the product is returned in its original or suitable equivalent container, freight prepaid, to an authorised AutoTest Service Centre. Transit insurance and return freight will be at the owner's expense.

In order to obtain calibration, warranty or non-warranty service, ship the product, freight and insurance prepaid to your nearest AutoTest Service Centre. Attach to the product your name, address, contact numbers, description of the problem and if a warranty claim, proof of purchase (dated sales receipt or invoice). AutoTest Products or an Authorised AutoTest Service Centre reserves the right to refuse warranty repair if accident, abuse, misuse or misapplication has damaged the product in transit or as a result of service or modifications by other than an Authorised Service Centre, nor are any other warranties expressed or implied, including any regarding merchantability or fitness for any other particular purpose.

AutoTest Products or an Authorised Service Centre is not responsible for incidental or consequential damages resulting from the breach of any express or implied warranty, including damage to property and, to the extent permitted by law, damages for personal injury.



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