TSafe

Vehicle Safety System

Operating Manual

For

Articulated and Rigid Tippers

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Introduction

TSafe is a modular safety system that combines all the best features of our best selling vehicle safety products. TSafe can be an Inclinometer, a high voltage overhead cable detector or both, combined with wireless capability and full event data recording. The TSafe display has a fully touch screen 3.5" back-lit display and a built in spoken audio voice warning .

Inclinometer

The TSafe system features a new two axis inclinometer that can monitor the vehicles angle left to right and front to back up to a maximum of 23 degrees in 0.1 degree increments, to enable the TSafe system to be used on almost any type of vehicle from a small tipper to a large quarry dump truck. We have also incorporated a body raised sensor which allows separate alarm angles to be programmed for body up or down positions.

High Voltage Detection System - HVDS

Building on our vast experience of Overhead Power Cable Detection the new TSafe system has our most advanced HVDS yet. New detection circuitry gives almost double the detection range, sensitivity and noise rejection over our existing HVDS unit. The TSafe's HVDS can be fully adjusted to suit the operating environment and gives a visual indication of detected signal strength and range. A new high gain detection antenna further improves the systems detection capabilities giving full 360 degree high voltage cable detection out to 25mtrs on 11Kv overhead power lines.

Wireless (wireless version only)

The TSafe sensor modules can be either hard wired or wirelessly connected back to the in cab display making installation and servicing very simple. There is also the ability to add up to 4 HVDS nodes to expand the High Voltage Detection Coverage on large vehicles and cranes.

Data Recording

The system has detailed event logging which records all alarm warnings, parameter and setting against a time and date stamp. In the event that an incident did happen then this data can be reviewed just like a black box flight recorder.

Main Component Parts

Please note: Not all of these components will be in your kit as some parts are optional. Please check the system specification and your packing list supplied with the kit.

TSafe display unit - Touch screen display that is visible to the driver and gives audio/visual warning for the various TSafe sensors on the vehicle.

ECU - 'The ECU is used to connect the display unit with any other sensors connected to the TSafe system. The ECU has a built in HVDS sensor, data ports, relay and auxiliary outputs.

TSafe Inclinometer sensor - 2 Axis Inclinometer sensor for use with the TSafe system. Gives inclination measurement left to right and front to back up to 22.9º. The unit is hard wired for power and data using RS485 communication.

External Warning Sounder - Gives spoken warning message "Danger! Stand Clear! Unstable Vehicle" at 85db when the Inclinometer alarm limit is reached or exceeded.

Pneumatic Tipper Cut-Off Valve - 12v DC Normally Closed air valve that is normally fitted in line with the 'UP' air line for the tipper PTO control. The valve automatically shuts off when the inclinometer alarm limit is reach or exceed to prevent the tipper body from being raised.

High Voltage Detection System (HVDS) Antenna - This is normally fitted to the vehicle cab roof and is used to detect the field that is emitted around high voltage overhead cables.

Tipper Body Raised Sensor - This is an Inductive proximity sensor that detects the presence of metal. It is normally mounted to the chassis underneath the tipper body and senses when the body is raised or lowered. It will detect steel up to 30mm from the surface of the sensor.

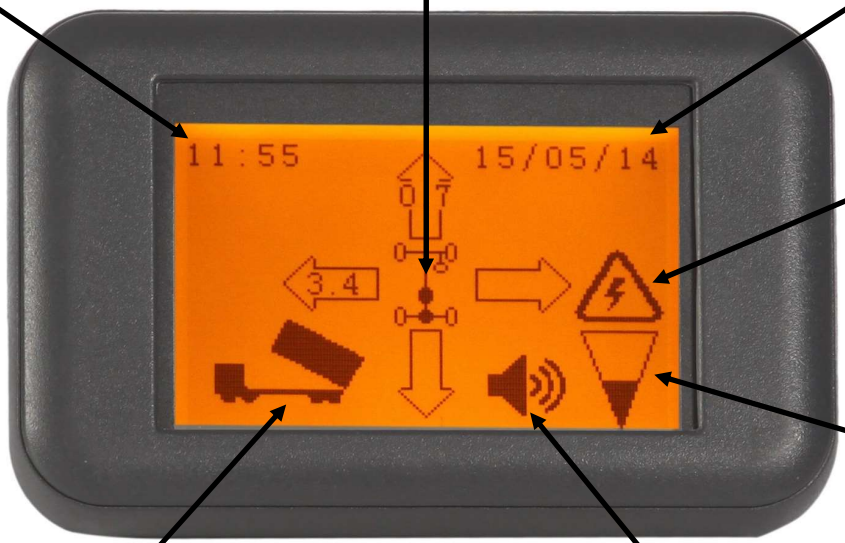
The TSafe Home Screen

Inclinometer indicator

Shows the current inclination of the vehicles chassis in the X and Y axis. i.e. left/ right and front/back.

Current Time (24hr)

Current Date (DD/MM/YY)



HVDS Active
This will flash when overhead cables are detected.

HVDS Sensing Level
Shows the detected signal level of the overhead power line.

Body raised indicator

Shows the body raised status of the vehicle

Mute button

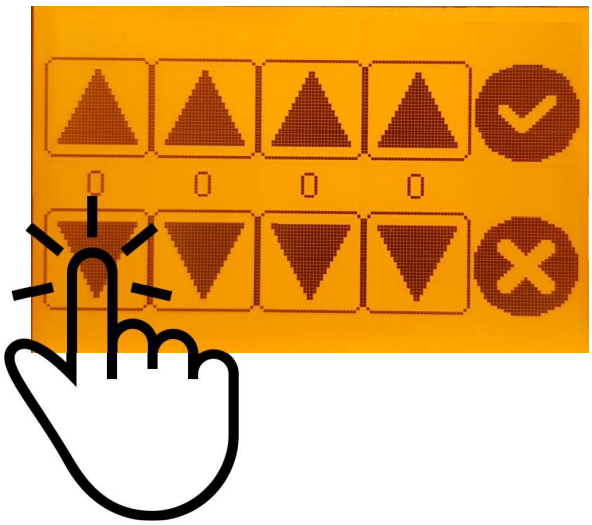
Pressing the screen here will mute the audio alarm

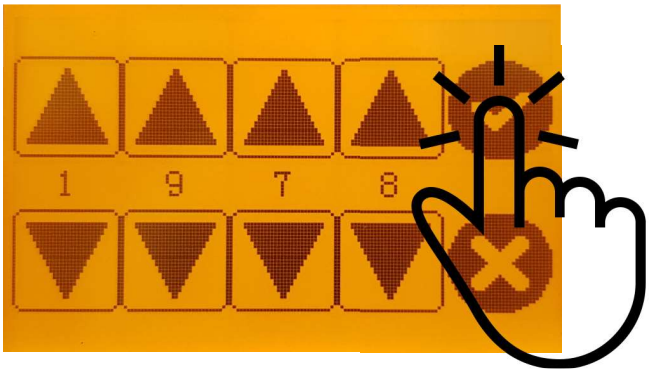
Menu Map

The TSafe system uses a resistive touch sensitive screen that requires a slight finger pressure to operate.

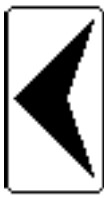
From the Main Screen (tap anywhere on the screen except over the 'MUTE' symbol to enter set-up mode)

Pass Code Entry Screen - Using the up/down arrows enter the 4 digit managers code to enter system set-up. The factory default code is '1978'





Navigating the menu system



Left Key

Moves menu left to next option

Right Key

Moves menu right to next option

Enter Button

Cancel/Exit Button

Menu Map

By pressing the left or right keys you can scroll through the various menu options. If the screen is not touched then the system will automatically revert to the home screen after 25 seconds.

Functions available in the managers mode:

Set time

Set Date

Add a device

(Only used on wireless version)

Remove a device

(Only used on wireless version)

Set Inclinometer alarm ROLL limit with body DOWN

Set Inclinometer alarm ROLL limit with body UP

Set Inclinometer alarm PITCH limit with body DOWN

Set Inclinometer alarm PITCH limit with body UP

Set High Voltage Detection alarm limit

Activate body raised audio alarm

Set power up mode

Override options

Change PIN code

System Event Log

Inclinometer zero point calibration

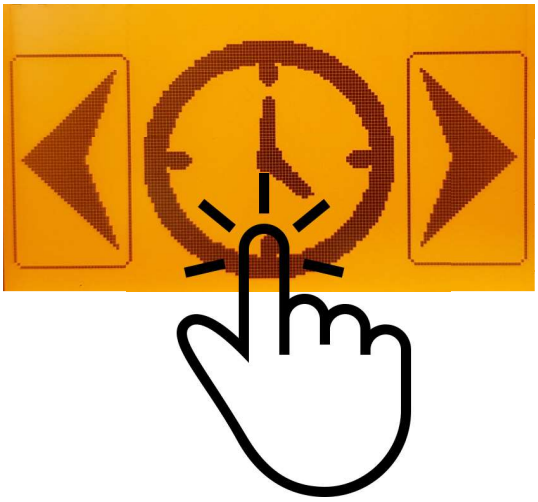
Setting the system time and date

1. Setting the system time

1.1 From the home screen, tap anywhere on the screen except over the 'MUTE' symbol ( ) to enter setup mode.

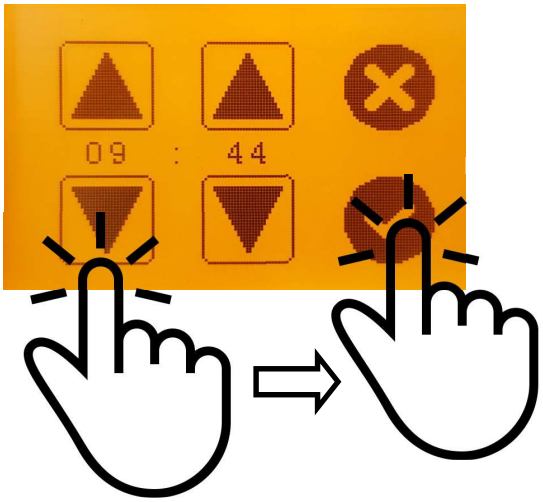
Enter the 4 digit managers code to enter the system setup.

Select the Time Setting menu



Press the symbol to enter time setting.

Using the up/down arrow keys set the current time (24hr clock), then press the enter symbol to confirm.

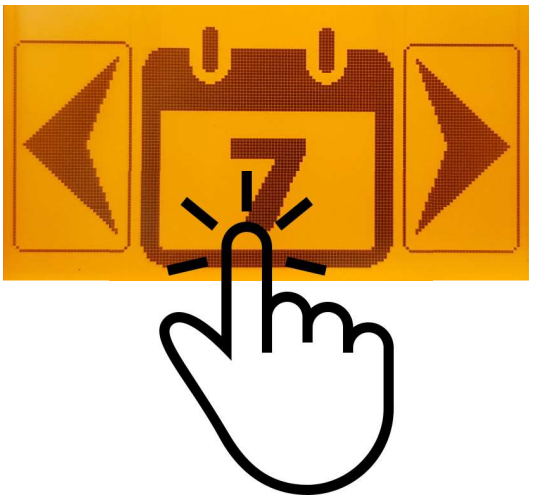


NOTE: The screen will automatically return to the 'HOME' view after pressing the confirm button.

Setting the system time and date

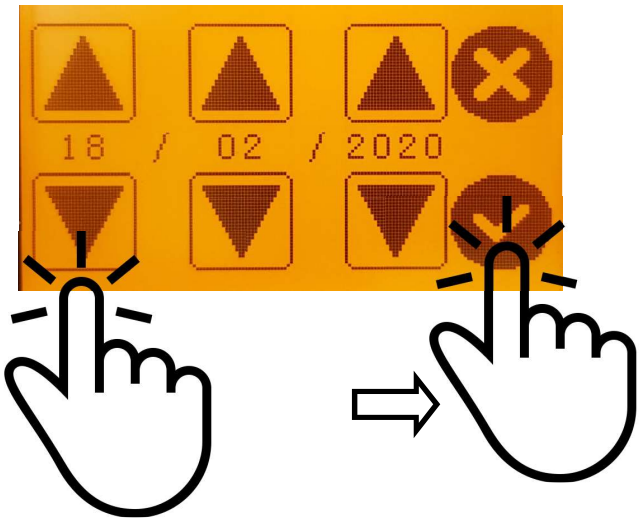
1.2 Setting the system date

Enter setup mode and scroll through the menu until the Set Date symbol appears.



Press the set date symbol to enter date setting.

Using the up/down arrow keys set the current date in the format DD/MM/YYYY then press the enter symbol to confirm.



2. Setting the Inclinometer Alarm Angle Thresholds

When the TSafe is being operated as an Inclinometer system, the vehicles angle can be measured in two axis, Left to Right (Roll) and Front to Back (Pitch). The TSafe's menu system allows for 4 separate alarm angles to be set. The combinations are as follows...

SET INCLINOMETER ALARM ANGLE LIMIT LEFT/RIGHT (ROLL) WITH BODY RAISED

SET INCLINOMETER ALARM ANGLE LIMIT FRONT/BACK (PITCH) WITH BODY RAISED

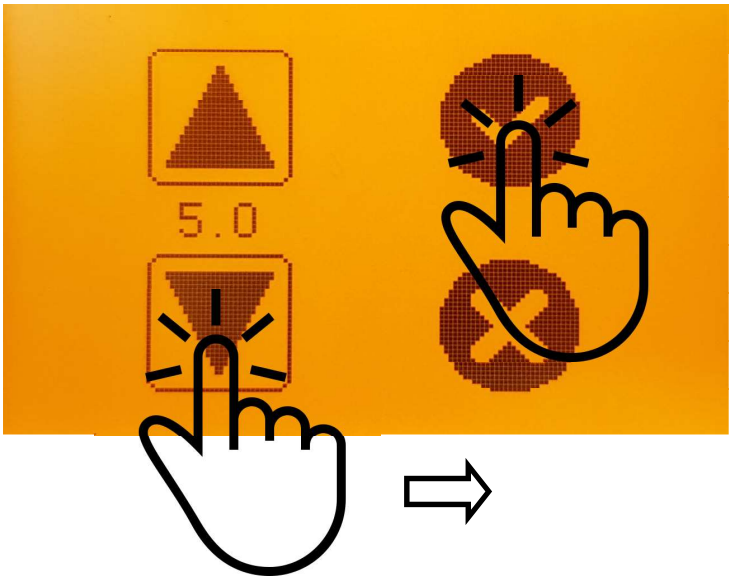
SET INCLINOMETER ALARM ANGLE LIMIT LEFT/RIGHT (ROLL) WITH BODY DOWN

SET INCLINOMETER ALARM ANGLE LIMIT FRONT/BACK (PITCH) WITH BODY DOWN

2.1 Enter setup mode and scroll through to the Inclinometer setting that you wish to adjust.

Select the required menu

Example:



Using the up/down arrows adjust the alarm angle setting. Once the desired angle is reached, press enter to confirm and store the setting.

The alarm limit can be set anywhere from 0.1° to 22.9°. Each press of the up or down key will increment the setting by 0.1°. When 22.9° is reached the setting will roll back to 0.0°

2.2 IMPORTANT SAFETY INFORMATION

The TSafe system will normally be factory set to 5º Left/Right Roll as standard. This means that when the inclinometer sensor detects that the chassis of the vehicle reaches 5º or above the alarm will sound in the cab and if a tipping cut-out valve is fitted the tipper body will be prevented from being raised.

It is the sole responsibility of the operator to ensure that the Inclinometer alarm limit is set to an angle which is below the maximum angle that the vehicle and/or trailer is capable of operating at. Failure to do so may result in an overturn accident before the TSafe system has alarmed. Contact your vehicle/ trailer manufacturer for advice on the maximum safe working limit.

It is also important to not set the alarm limit too low. The Inclinometer sensor is a very sensitive instrument which can detect variations in angle of 0.1º. It is not recommended that the alarm limit is set below 1º except for special applications. It is also normal for the inclinometer reading to jump around by a few point of a degree. This is the sensor detecting very small movements caused by wind and vibration. Please contact Transport Support for further advice.

When fitted with a TS Inclinometer sensor, the TSafe system will give full vehicle stability warning and also indicate to the operator the exact angle of the chassis in both axis. The Inclinometer sensor measures the lean of the chassis Left to Right and front to back. These measurements and any alarm warnings are displayed on the TSafe's home screen in a simple 4 point graphic (Shown below).

The vehicles camber angle will be displayed in the arrow that points in the direction of lean. The directions that are in negative values will remain blank.
When the angle reaches 10% below the alarm limit the arrow(s) pointing in the direction of lean will begin to flash. This is to warn the operator that they are reaching the maximum safety limit.
If the inclinometer alarm limit is reached or exceeded the arrow(s) pointing in the direction of lean will turn sold black and the alarm will sound.

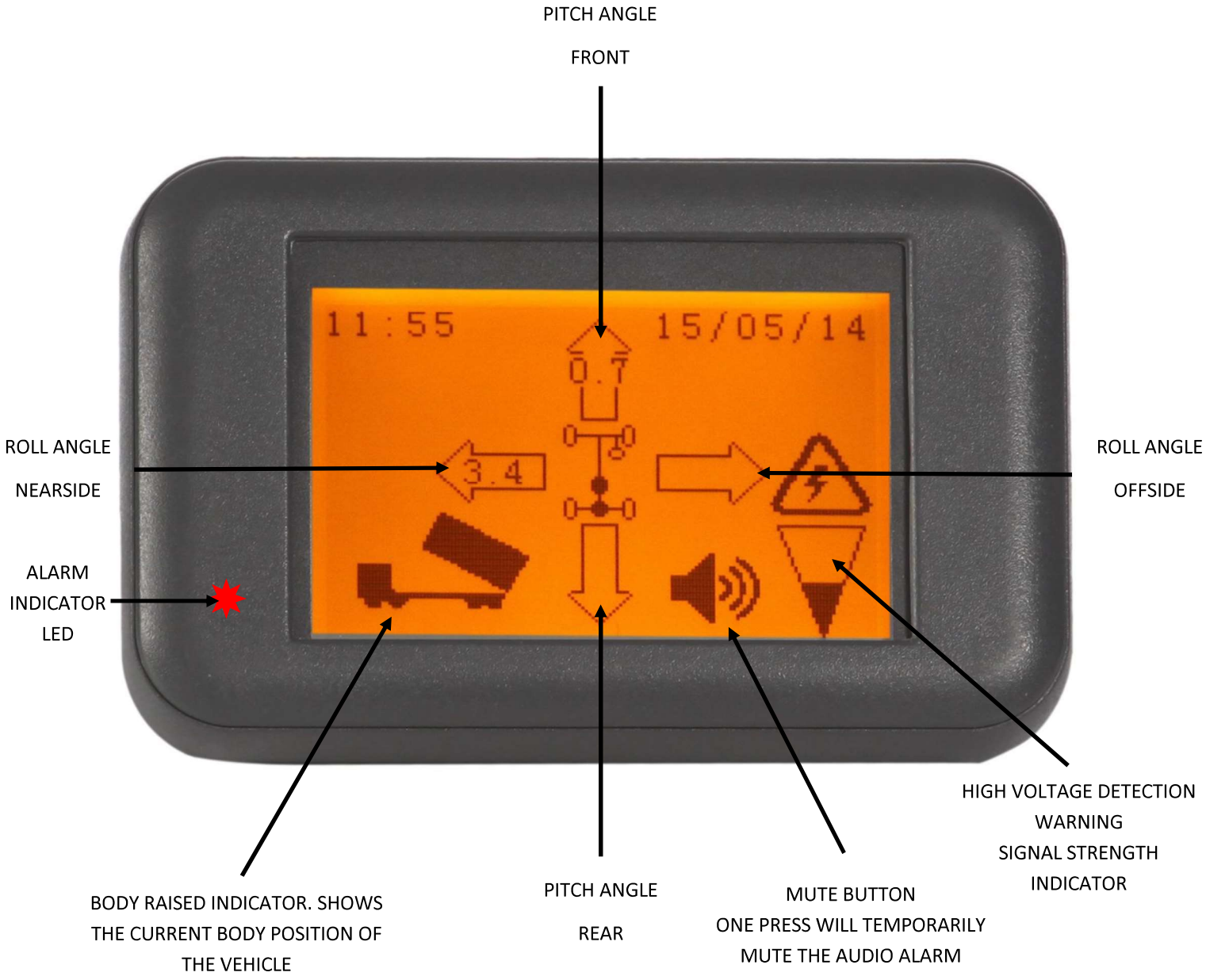
The TSafe has a spoken voice warning alarm which gives the message "TILT WARNING" followed by a pulsed 'beep' tone when the alarm angle is reached or exceeded. A high intensity red LED will also flash on the front of the TSafe Display.

IF THE TSAFE SOUNDS AN ALARM INDICATING AN UNSTABLE VEHICLE AND HAS REACHED THE SET LIMIT OR IF IT IS WARNING YOU THAT YOU ARE CLOSE TO THE SAFE WORKING LIMIT

STOP!

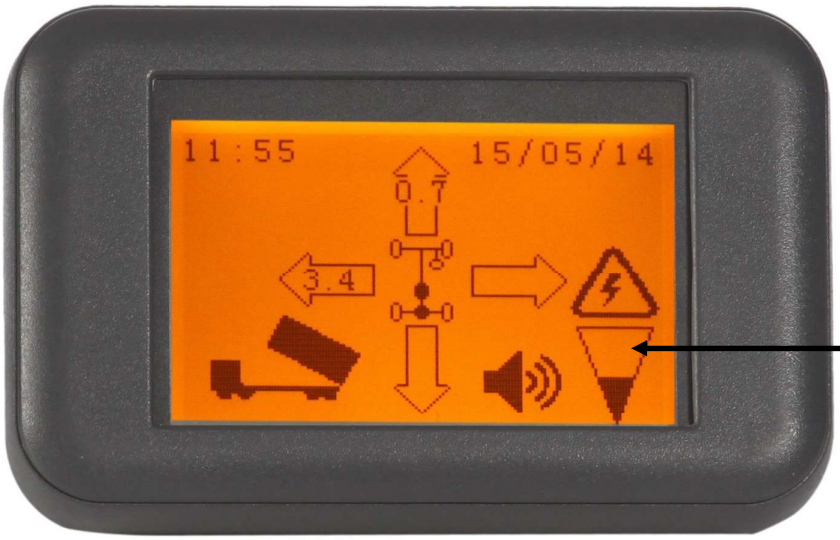
SLOWLY LOWER THE BODY IF IT IS BEING RAISED AND REPOSITION THE VEHICLE USING THE TSAFE AS A GUIDE TO A SAFE WORKING CAMBER.

Home Screen Alarm Warning Layout



3. Setting the Overhead High Voltage Detection Alarm - Overview

When the TSafe is being operated as an overhead high voltage power cable detector (HVDS), a signal strength meter will be displayed on the main screen. In the centre of the screen when no inclinometer is fitted or to the right of the screen when operating with an inclinometer.



Overhead High Voltage Detector signal strength.

The overhead high voltage detection system (HVDS) works by detecting the electrical field and frequencies that are emitted by overhead high voltage cables. In general most overhead power lines will emit a field which will extend out from them. The greater the voltage and to some degree the current draw on the overhead lines, the greater this field will extend out from them. The HVDS will detect this field and trigger an alarm condition when the detected signal reaches or exceeds the pre-set limit.

Due to the nature of overhead power lines, different voltages, cable configuration etc it is not always possible and is certainly not recommended to set a detection range in meters as each power line will emit a field out to a different range.

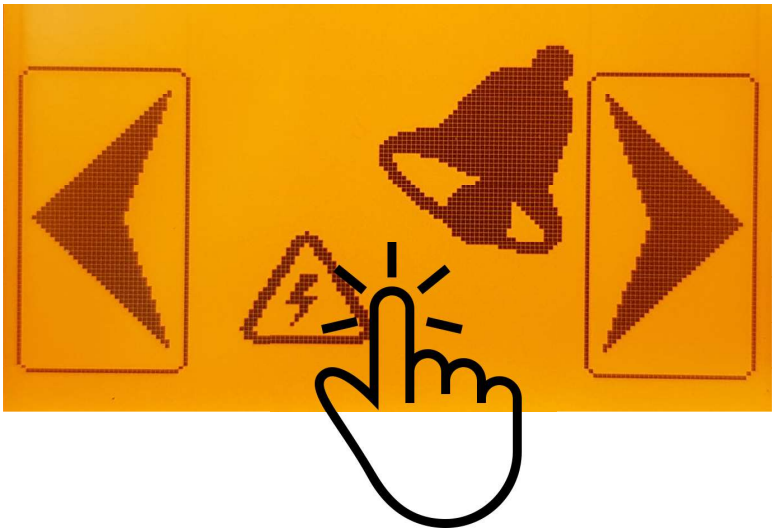
It is therefore recommended that vehicles that are constantly moving from site to site, such as aggregates tippers, are set to a high sensitivity (As factory set) and **not adjusted**. This will give optimum cable detection performance and alert the operator to the presence of overhead power lines.

If TSafe is being used on a vehicles or machine which remains stationary at one particular site such as excavators and cranes, it can be adjusted so as to give an indication of proximity to the particular over-head power lines that are closest to the vehicle.

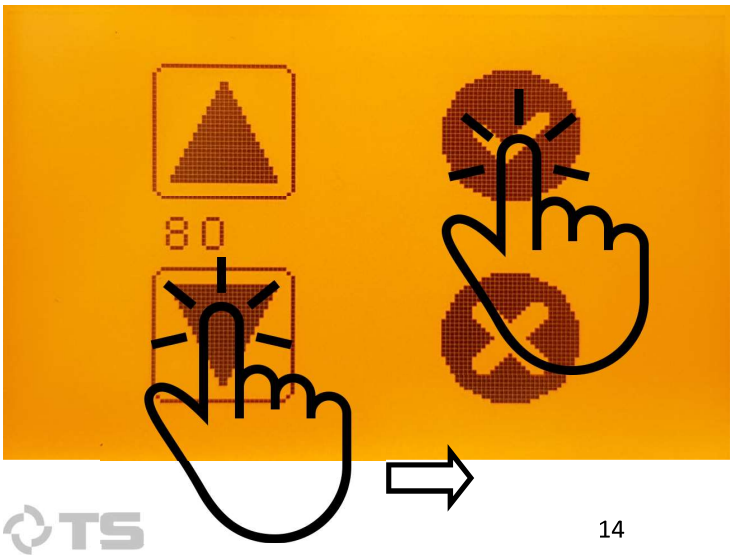
5.1 Setting the Overhead High Voltage Detection Alarm Threshold.

Enter set-up mode and scroll through the menu to the SET HVDS LIMIT symbol.

Select the SET HVDS LIMIT menu



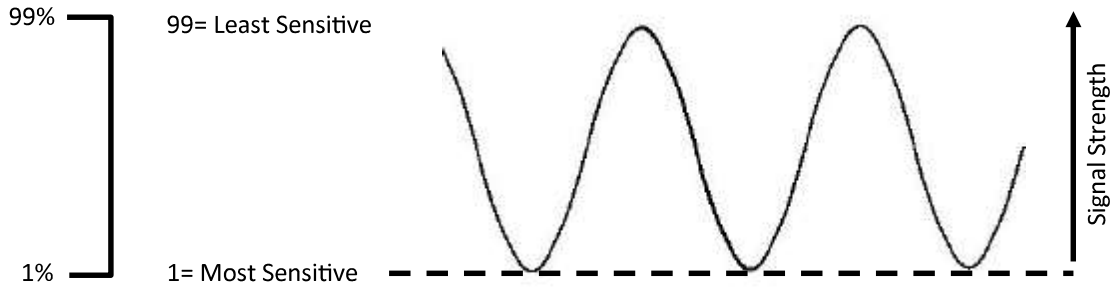
Press the symbol to enter time setting.



Use the up/down keys to adjust the setting. Once the desired setting is reached, press enter to confirm and store the setting.

The alarm limit can be set anywhere from 0 to 99. Each press of the up or down key will increment the setting by 1. When 99 is reached the setting will roll back to 0

It is important to note that the lower the setting number the higher the sensitivity of the detector. For example, if the HVDS alarm was set at 20 it would have to detect a high voltage signal 20% above back-ground noise before the alarm triggered.



Note: The alarm setting will be the same across all HVDS nodes that are connected to the TSafe system.

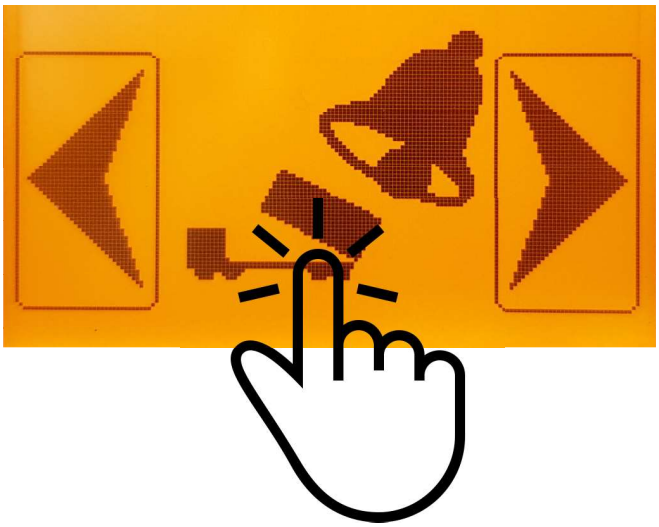
The TSafe's HVDS signal strength meter proportionally adjusts to the alarm setting. Therefore, if the alarm limit was set to 25 then the bottom of the scale would be 0 and the top of the scale would be 25.

Example set at 25:

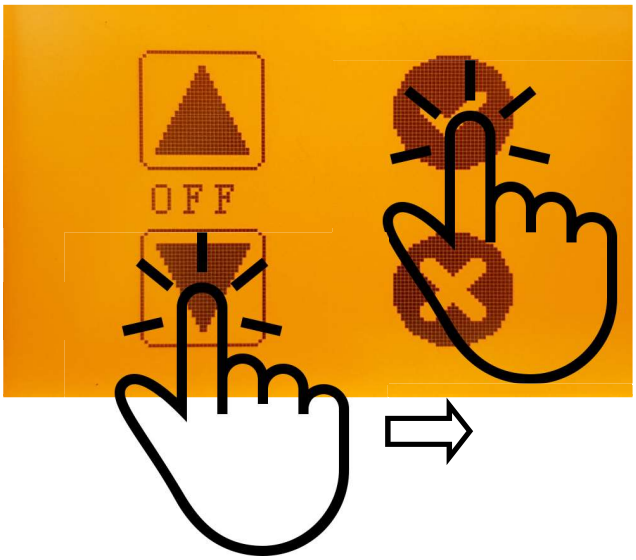
Setting the Body Raised Audio Alarm

4. Body Raised Audio Alarm

4.1 Enter setup mode and scroll through the menu until the Body Raised Alarm symbol appears



Press the Body Raised Alarm symbol to enter the setting.



Use the up/down keys to switch between ON or OFF. Once the desired setting is reached, press enter to confirm and store the setting.

When the Body Raised Alarm setting is set to ON and audible 'Bleep' tone will be heard whenever the tipper body is raised off the chassis. The audible alert will continue as long as the tipper body is raised. It will automatically switch off once the body is fully lowered to the chassis.

Setting the system power up mode

5. Standby Modes

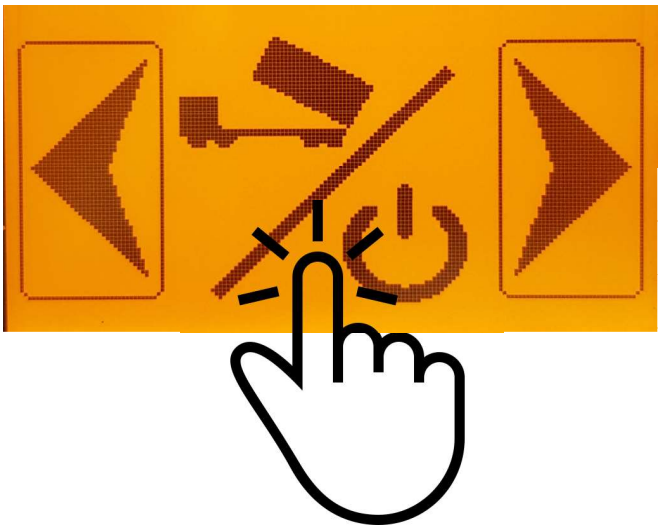
5.1 Setting auto or manual power up

The TSafe system can be set to automatically wake from standby each time the tipper body is raised or can be set up for manual operation by pressing an on screen button. In normal operation the TSafe system is powered up when the vehicles ignition is on. The system will then be in standby mode and the various inclinometer and high voltage detection displays can be viewed but the system will not alarm.

Functions:

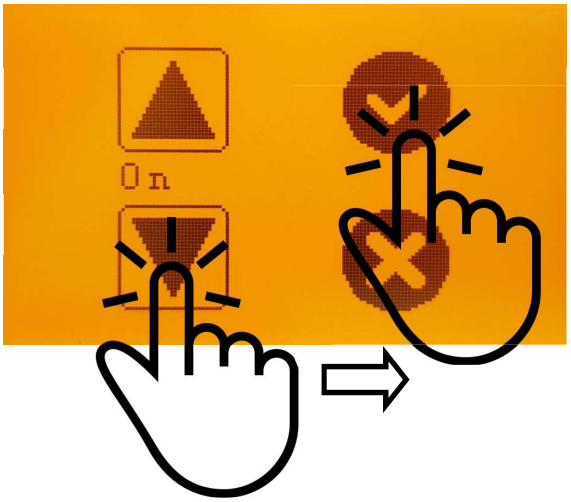
Automatic = ON - The system will automatically wake from standby when the tipper body is raised off the tipper body proximity sensor.

Manual = OFF - A power ON button will be displayed on the Home screen. Pressing this button will bring the TSafe system out of standby. Pressing the button again will put the system back into standby mode.



Press the Standby Mode symbol to enter the setting.

Use the up/down keys to switch between ON or OFF. Once the desired setting is reached, press enter to confirm and store the setting.



Manual Override and Relay Outputs

6. Setting the manual override

6.1 The TSafe system has various modes of operation to automatically prevent the tipper body from being raised if the inclinometer alarm limit has been reached or exceeded.

Modes of operation:

Auto = The TSafe system will automatically switch the relay outputs that control the tipper cut-off valve when an unsafe angle limit is reached or exceeded. The TSafe ECU normally gives a +12v output and this is switch off when in an alarm state.

Aux 1 = Relay output AUX1 will be overridden. +12v will be permanently outputted on AUX1 . This is the output that controls the tipper cut-off valve.

Aux 2 = Relay output AUX2 will be overridden. 0v will be permanently outputted on AUX2. This is the output that controls the external voice waring sounder.

Both = Both AUX1 and AUX2 outputs will be overridden. Aux1 will be permanently at +12v and Aux2 will be permanently at 0v.

When any of the outputs are overridden a lock symbol will appear on the home screen to indicate the override status.

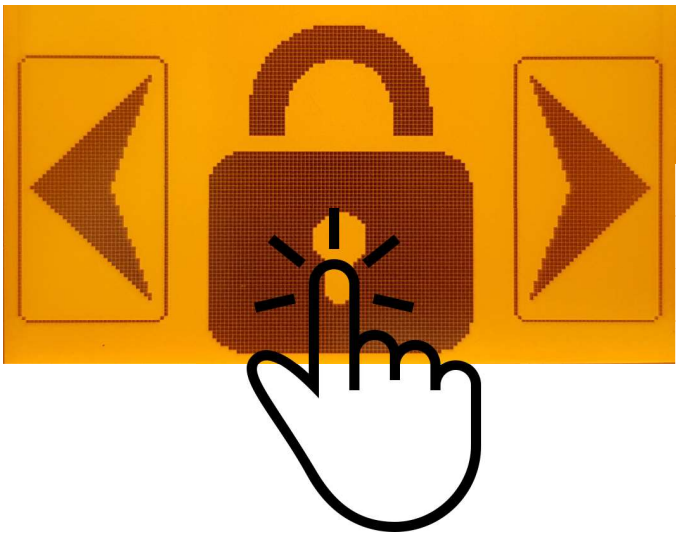
IT IS IMPORTANT TO NOTE THAT THE TSAFE SYSTEM AUTOMATICALLY RECORDS ALL SETTING CHANGES TO ITS INTERNAL MEMORY AGAINST A TIME AND DATE STAMP. IT IS ALSO VERY DANGEROUS TO OVER-RIDE ANY SAFETY DEVICE. TRANSPORT SUPPORT DOES NOT RECOMMEND ACTIVATING THE TSAFE OVERRIDE MENU WITHOUT PERMISSION AND EXPERT ADVICE.

OVERRIDING THE TSAFE SYSTEM COULD RESULT IN A SERIOUS ACCIDENT

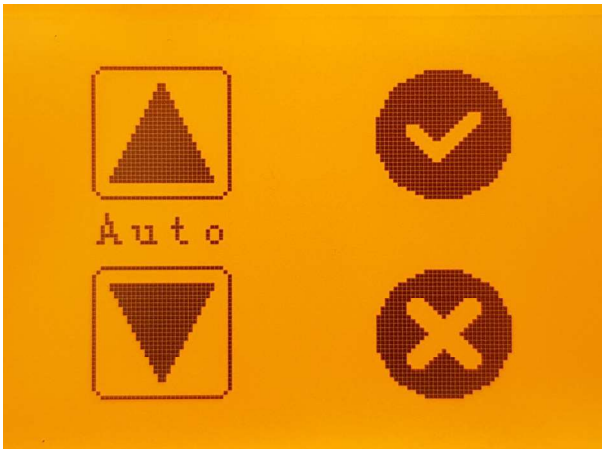
Note: When the system is set to Auto, the TSafe system will automatically control Aux1 & 2. They will be switched when the inclinometer limit alarm is activated.

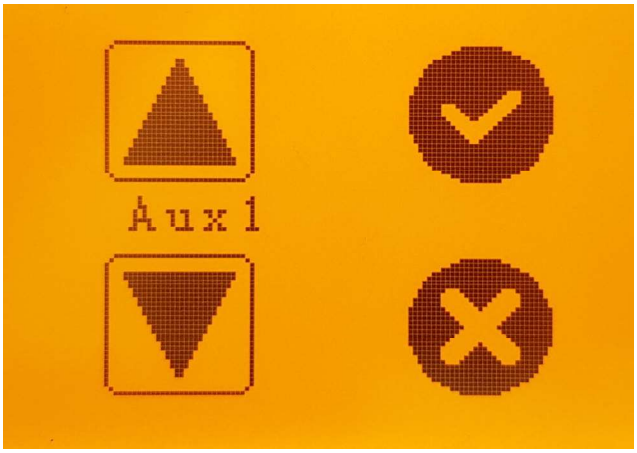
The relays will switch for the duration of the alarm and switch back when the alarm stops.

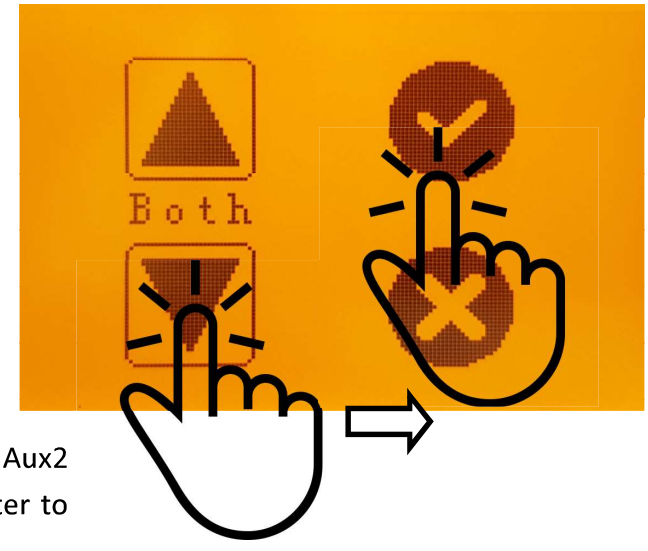
6. Setting the manual override *Continued...*



Press the Override Menu symbol to enter the setting.







Use the up/down keys to switch between Auto, Aux1, Aux2 or Both. Once the desired setting is reached, press enter to confirm and store the setting.

7. Management Lock Code

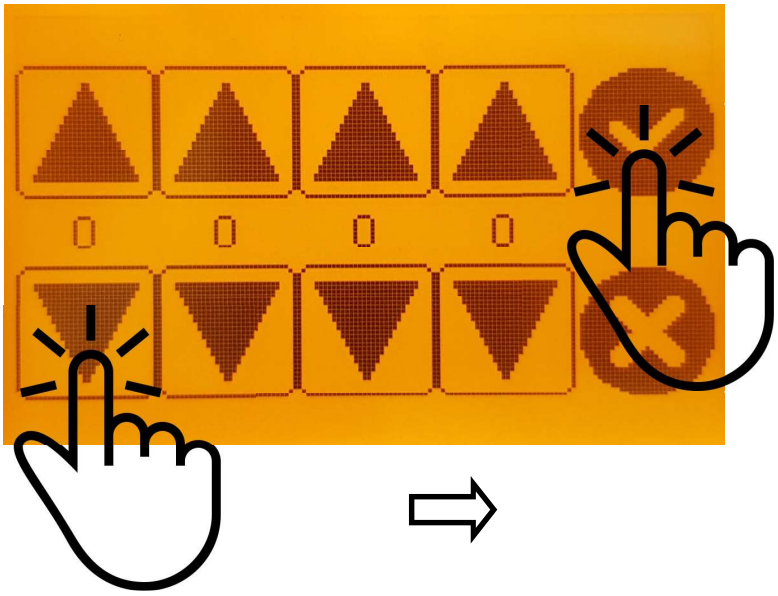
7.1 Changing the system PIN

TSafe is protected by a 4 digit PIN to prevent unauthorised access to the menu and system settings. The default system PIN is 1978 unless it has been ordered with a specific pre-set PIN (contact your manager or Transport Support for further details).

IT IS RECOMMENDED THAT YOU CHANGE THE DEFAULT PIN PRIOR TO MAKING THE SYSTEM OPERATIONAL TO PREVENT UNAUTHORISED ACCESS TO THE SETTINGS. TSAFE WILL AUTOMATICALLY STORE ALL CHANGES TO ITS SETTINGS AND PIN CHANGES. **THIS INFORMATION CAN BE RETRIEVED FROM MEMORY TO TRACE ANY ATTEMPT AT UNAUTHORISED ACCESSES TO THE SYSTEM SETTINGS.**

Enter set-up mode and scroll through the menu to the SET PIN CODE button

Press the PIN Setting Menu symbol to enter the setting.



Using the up/down arrows, enter a new 4 digit managers PIN

BE SURE TO MAKE A NOTE OF THE NEW 4 DIGIT PIN.

Once the desired PIN is set, press enter to confirm and store the setting.

The screen will revert back to the main home screen and the new PIN will be required to enter the menu system again.

NOTE: CHANGES TO THE PIN CODE ARE AUTOMATICALLY RECORDED TO THE SYSTEMS INTERNAL MEMORY AS AN EVENT BUT THE ACTUAL 4 DIGIT PIN CODE IS NOT RECORDED AND CANNOT BE RECOVERED IN THE EVENT LOG.

BE SURE TO MAKE A NOTE OF THE NEW NUMBER! IF THE PIN IS LOST OR FORGOTTEN AND IT HAS BEEN CHANGED FROM THE PRE-SET FACTORY PIN CODE, THEN THE DISPLAY UNIT WILL NEED TO BE RETURNED TO TRANSPORT SUPPORT FOR UNLOCKING. CHARGES MAY APPLY. THIS IS A SAFETY FEATURE OF THE SYSTEM TO PREVENT TAMPERING.

8. System Event Log

8.1 Viewing the event log summary.

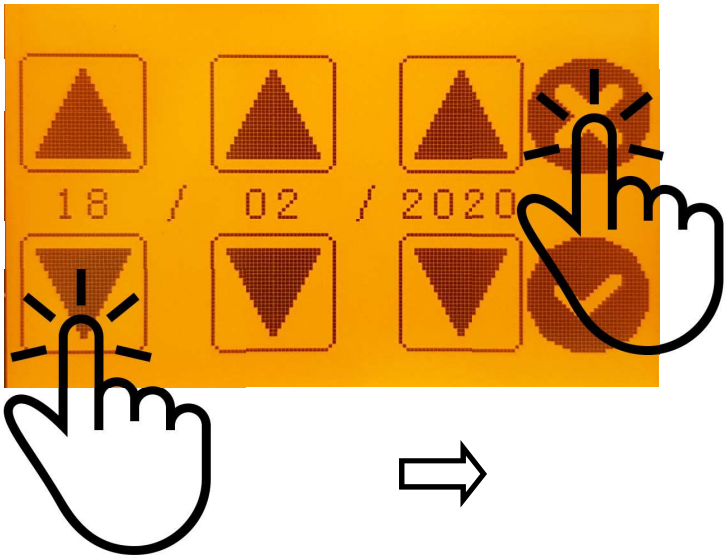
The TSafe system is factory fitted with an internal 16GB SD Memory Card. The memory card cannot be accessed for the outside of the casing and is only intended to be accessed by authorised technicians.

IF FULL ACCESS TO THE INTERNAL MEMORY CARD IS REQUIURED PLEASE CONTACT TRANSPORT SUPPORT.

An on-screen event log is accessible via the system menu and gives all of the standard event log features that are normally required in regular operation.

Enter set-up mode and scroll through the menu to the EVENT LOG button

Press the EVENT LOG Menu symbol to enter the setting.

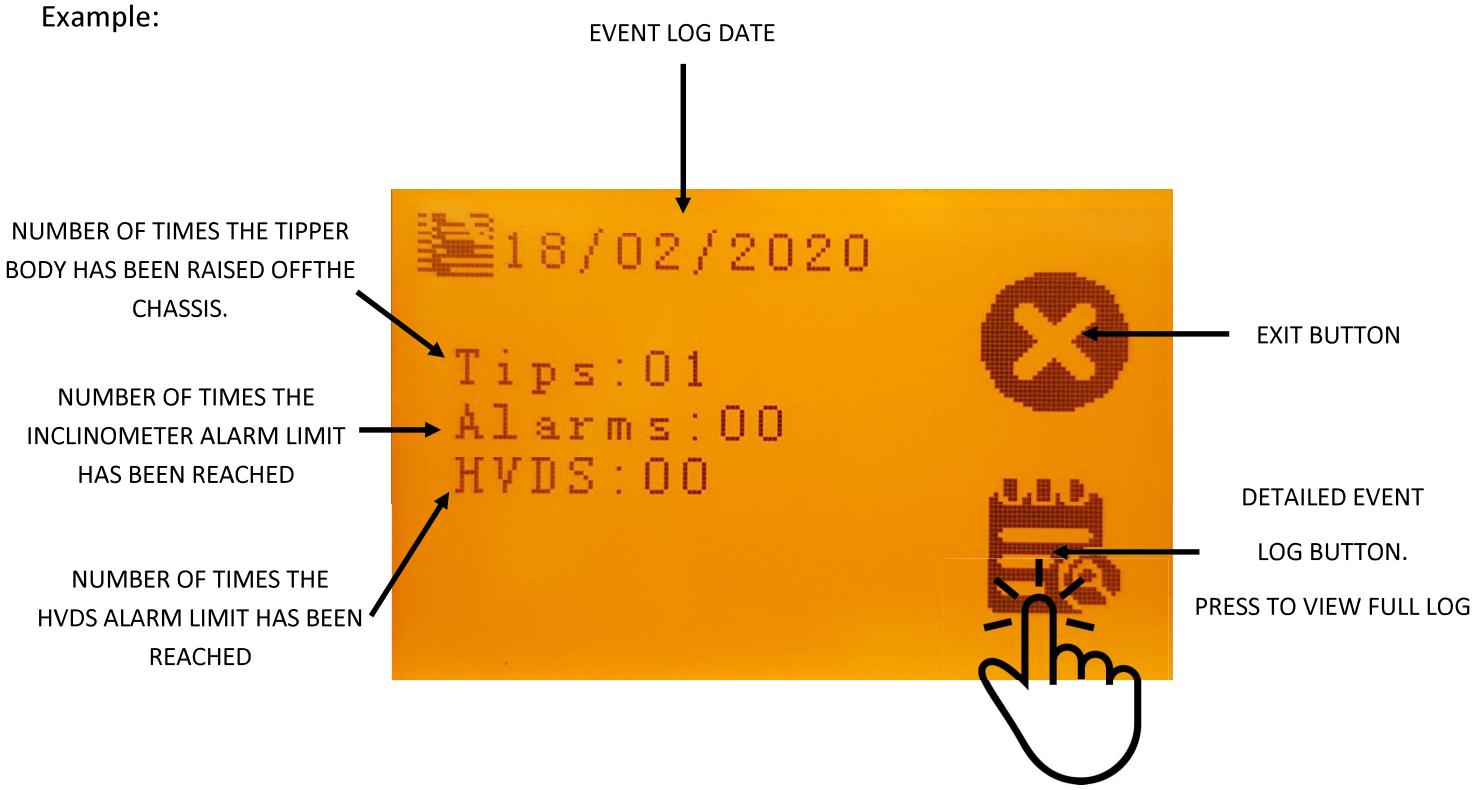


Using the up/down arrows, enter the date of the event log you wish to view. The date format is DD/MM/YYYY. Once the desired date is entered, press the enter symbol to confirm.

8.1 Viewing the event log summary. *Continued...*

The event log summary page for the date entered will now be displayed.

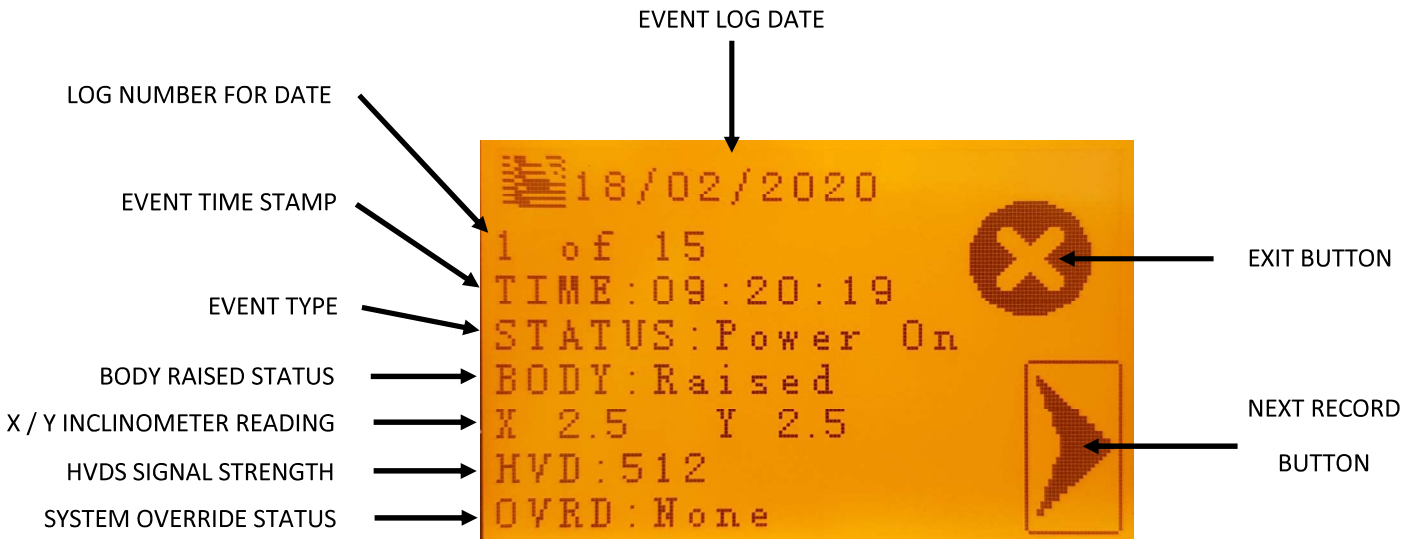
Example:



The above counts displayed in the event log summary represent the number of times an audio/visual warning has been given to the operator.

8.2 Viewing the detailed event log

Press the DETAILED LOG button to enter the full log for each event on the selected date.



EC Declaration of Conformity

Name of Manufacture: Transport Support (A division of GN Systems Ltd)

Certificate Number: TSCOC/TSAFE/220120/A

Address:

Units 10-12 Undershore Business Park
Brookside Road
Bolton
BL2 2SE

United Kingdom

In accordance with the following directive(s):

2014/30/EU EMC Directive

Equipment identified within this Declaration of Conformity

Titles and Numbers of Relevant standards

Product Code	Product Name
TSafe	Inclinometer System

Standard	Title
BS EN55032:2015	Electromagnetic combability of multimedia equipment. Emission requirements
BS EN50498:2010	Electromagnetic Combability (EMC) – Product family standard for aftermarket electronic equipment in vehicles
BS EN61000-4-3:2006	Electromagnetic compatibility (EMC). Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test
BS EN61000-4-6:2014	Electromagnetic compatibility (EMC). Testing and measurement techniques. Immunity to conducted disturbances, induced by radio-frequency fields
BS EN61000-4-2:2009	Electromagnetic compatibility (EMC). Testing and measurement techniques. Electrostatic discharge immunity test

Name: Matthew Taylor

Position: Technical Manager Signature: 

Technical Specifications

General

Operating Voltage	10-28v DC (nominal 12-24v DC)
Nominal Operating Current	400mA
Communication standard	RS485
Internal Memory	SD Card 16GB (Max 32Gb) Class 10

Inclinometer

Sensor range	+/- 22.9°
Sensor resolution	+/- 0.1°
Repeatability	+/- 0.1°
Sensor operating temperature	-30°C to +55°C

Cut-off Valve

Operating Voltage	12v DC
Operating Current	170mA
Operating Pressure	0-125 P.S.I.
Operating Temperature	0° to +50°C

Voice Warning Sounder

Operating Voltage	12-24v DC
Sound Level	85db
Frequency	Speech - M.I.R.A. tested for on and off highway

Protection Rating

External Electronic Connections	IP68
Sensor Casing	PVC IP68
In Cab Display	ABS IP55
ECU	Aluminium IP55
External Sounder	ABS IP68