OSID by Xtralis

Troubleshooting Guide

For Imagers with Firmware V4.00.3 - Diagnostic V 3.00.4 onwards

April, 2014
Doc. 25685_03

Disclaimer

The contents of this document are provided on an "as is" basis. No representation or warranty (either express or implied) is made as to the completeness, accuracy or reliability of the contents of this document. The manufacturer reserves the right to change designs or specifications without obligation and without further notice. Except as otherwise provided, all warranties, express or implied, including without limitation any implied warranties of merchantability and fitness for a particular purpose are expressly excluded.

Intellectual Property and Copyright

This document includes registered and unregistered trademarks. All trademarks displayed are the trademarks of their respective owners. Your use of this document does not constitute or create a license or any other right to use the name and/or trademark and/or label. This document is subject to copyright owned by Xtralis. You agree not to copy, communicate to the public, adapt, distribute, transfer, sell, modify or publish any contents of this document without the express prior written consent of Xtralis.

General Warning

This product must only be installed, configured and used strictly in accordance with the General Terms and Conditions, Technical and User Manual and product documents available from Xtralis. All proper health and safety precautions must be taken during the installation, commissioning and maintenance of the product. The system should not be connected to a power source until all the components have been installed. Proper safety precautions must be taken during tests and maintenance of the products when these are still connected to the power source. Failure to do so or tampering with the electronics inside the products can result in an electric shock causing injury or death and may cause equipment damage. Xtralis is not responsible and cannot be held accountable for any liability that may arise due to improper use of the equipment and/or failure to take proper precautions. Only persons trained through an Xtralis accredited training course can install, test and maintain the system.

Liability

You agree to install, configure and use the products strictly in accordance with the User Manual and product documents available from Xtralis.

Xtralis is not liable to you or any other person for incidental, indirect, or consequential loss, expense or damages of any kind including without limitation, loss of business, loss of profits or loss of data arising out of your use of the products. Without limiting this general disclaimer the following specific warnings and disclaimers also apply:

Fitness for Purpose

You agree that you have been provided with a reasonable opportunity to appraise the products and have made your own independent assessment of the fitness or suitability of the products for your purpose. You acknowledge that you have not relied on any oral or written information, representation or advice given by or on behalf of Xtralis or its representatives.

Total Liability

To the fullest extent permitted by law that any limitation or exclusion cannot apply the total liability of Xtralis in relation to the products is limited to:
(i) in the case of services, the cost of having the services supplied again; or
(ii) in the case of goods, the lowest cost of replacing the goods, acquiring equivalent goods or having the goods repaired.

Indemnification

You agree to fully indemnify and hold Xtralis harmless for any claim, cost, demand or damage (including legal costs on a full indemnity basis) incurred or which may be incurred arising from your use of the products.

Miscellaneous

If any provision outlined above is found to be invalid or unenforceable by a court of law, such invalidity or unenforceability will not affect the remainder which will continue in full force and effect. All rights not expressly granted are reserved.

Contact Us

UK and Europe +44 1442 242 330 D-A-CH +49 431 23284 1 The Americas +1 781 740 2223

Middle East +962 6 588 5622 Asia +86 21 5240 0077 Australia and New Zealand +61 3 9936 7000

www.xtralis.com

Contents

1 General 1

2 What to do if a customer reports a faulty system during a site visit 1

2.1 If OSID Diagnostic Tool is not available 1

2.2 Using the OSID Diagnostic Tool 3

2.2.1 Icons in the task bar 3
2.2.2 Connecting the PC 4
2.2.3 Retrieving the event log 5
2.2.4 Opening the event log 6
2.2.5 Analysing the event log 7
2.2.6 Creating graphs from the event log 9

3 Imagers on site that are not equipped with latest V4 firmware 13

4 Using earlier OSID Diagnostic versions 14

5 Troubleshooting on-site using OSID Diagnostics 14

5.1.1 View static video image 14
5.1.2 View grey levels 15
5.1.3 View Reference levels 15

5.2 The fault messages 16

5.2.1 System Fault codes 16
5.2.2 Emitter fault codes 17

5.3 Leaving the PC for logging purposes on site 20

6 Some typical causes of specific faults or alarms 21

6.1 Align and fully engage eyeball 21

6.2 Sensitivity settings 21

6.3 Initialising 21

6.3.1 Initialising in temporarily dirty or smoky environments 21
6.3.2 Initialising in direct sunlight and in very bright environments 22

6.4 Multiple Emitters in Field Of View (FOV) 23

6.4.1 OSI-90 and OSI-45 23
6.4.2 OSI-10 24

6.5 Upgrading firmware 25

7 Specific behaviour 26

7.1 Recovery time 26

7.2 Knock recovery 26

1 General

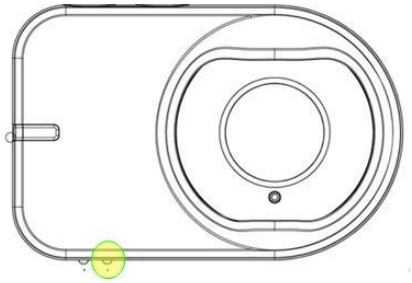
An OSID system consists of an Imager and one or more Emitters. The Emitter has no visual user interface so all system fault information, for both Emitter and Imager, is available at the Imager.

The LED on the Imager is common for all Emitters/beams and a blink sequence allows decoding of fault information per beam.

2 What to do if a customer reports a faulty system during a site visit

Make sure that the unit does NOT get reset or re-initialized (powered down) before a fault analysis is done.

2.1 If OSID Diagnostic Tool is not available



In its simplest form analysis is done by looking at the fault LED at the bottom of the respective Imager. The fault LED blink sequence will indicate the type of fault.

The LEDs are quite clear/bright when you position yourself right under the Imager, even at considerable heights.

The yellow color of the bi-color LED indicates if the unit is in *Training Mode* or if there are *Trouble* conditions. The identification of the Trouble (Fault) condition and its source (Emitter/Imager) can be determined by the sequence of pulses of the yellow LED. The identification sequence is described as follows:

a) Source identification: Yellow LED pulses according to whether the Trouble originates from the Emitter or system:

   (i) 'n' pulses identifies Emitter Beam 'n' as having a Trouble (Fault) condition.

   (ii) A double pulse identifies the system as having a Trouble condition.

b) 2 seconds OFF.

c) Trouble (Fault) Code: The Yellow LED signals the fault type according to the pulsing sequences identified in the Table below.

d) If more Faults are present: 5 seconds OFF. If no other Faults are present in the system: 10 seconds OFF.

e) Restart from step a.

Emitter/System Fault	Activation Sequence	Status
-	Double pulse every one second	Training mode.
Emitter (One or more slow pulses)	One pulse	Emitter failed, obscured or misaligned.
	Two pulses	Contamination fault. Emitter and Imager require cleaning.
	Three pulses	Emitter range fault. Emitter is either too close or too far away.
	Four pulses	Emitter type mismatch. Emitter type is not recognized by the receiver.
	Five pulses	Emitter battery approaching end of life and needs to be replaced at the next scheduled maintenance visit. Note: Smoke detection continues to function while there is sufficient residual battery power. A trouble is signaled to the fine panel once the battery life is exceeded.
	Six pulses	Imager cannot discern the signal from the Emitter beam due to an oversaturation of light. Please check for reflections onto the Imager, or bright light sources adjacent to the Emitter when viewed from the Imager.
System (Double pulse)	One pulse	Incorrect DIP switch configuration. Refer to section 4.2.5 for further details. Note: Unused DIP switches must be set to '0'.
	Two pulses	Too many Emitters have been detected. Check the DIP switch settings, and ensure the Emitters belonging to a different system are not interfering with the Imager.
	Three pulses	Too few Emitters have been detected. Check the DIP switch settings and ensure that all Emitters are contained in the field of view of the Imager.
	Four pulses	Imager out of alignment. Check that the field of view of the Imager is correctly aligned to all Emitters in the system.
	Five pulses	Internal fault in the Imager. Imager requires replacement.

Now you have determined the fault you can, depending on its nature, investigate the cause and remedy, or replace the Imager and/or Emitter.

The *remedy* depends on the fault:

- as simple as removing the object that is obstructing the beam(s)
- clean the lenses
- re-aligning the Emitter(s) or Imager

2.2 Using the OSID Diagnostic Tool

Plugging your PC into the Imager's serial port and using the OSID Diagnostic Tool offers the Service Engineer in-depth and visual information to diagnose fault conditions.

Imagers equipped with firmware from V4 onwards have an on-board memory that contains, stored on FIFO basis, all alarms and faults in the system as well as all significant changes in the system. Significant changes include IR/UV signal variations, even those that have not led to an alarm, Emitter position changes and temperature changes.

On site, when connecting your PC via the FTDI cable make sure **not to switch off the power supply to the Imager.** The Imager memory is storing events with a counter because there is no real time clock available in the Imager.

When connecting the PC, the program will use the PC's time and date to create a timeline for the stored events. **Verify that your PC has the correct time and date before connecting**.

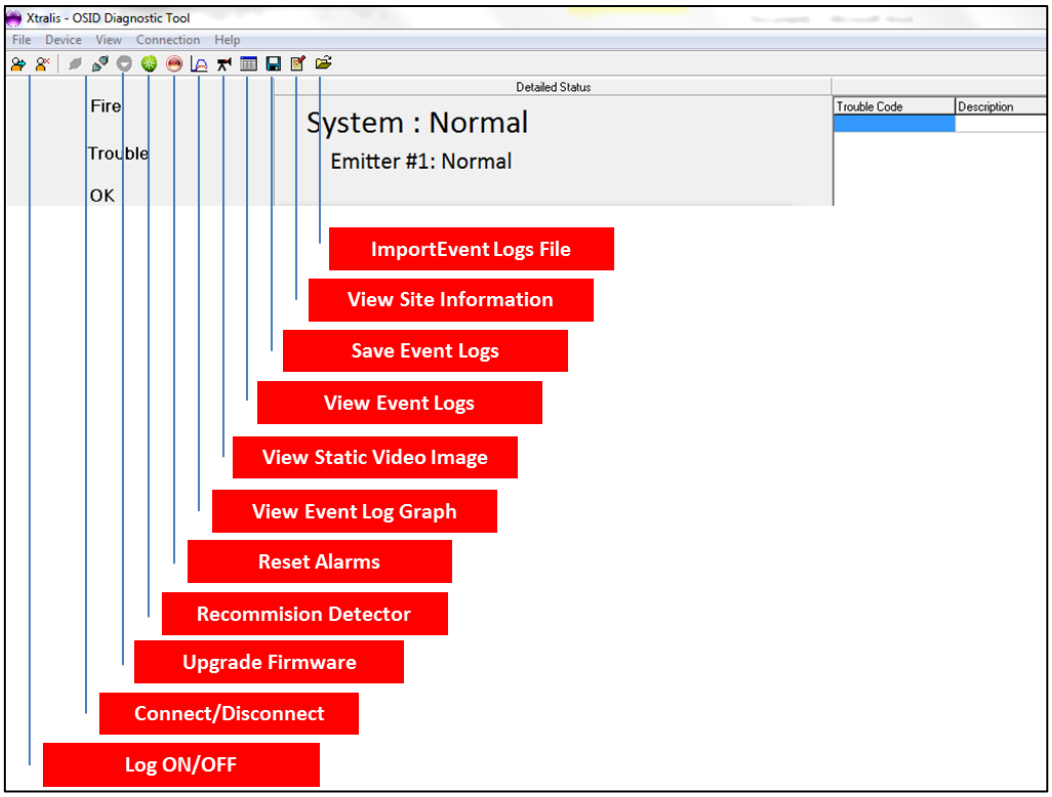
If the Imager was powered down the events will be presented as data points over a scale that reflects parts of a day. You will have all events and the period these lasted but without time and date stamp.

In this case you can (try to) correlate the events to the events in the FCAP log and estimate the time line in this way.

NOTE!

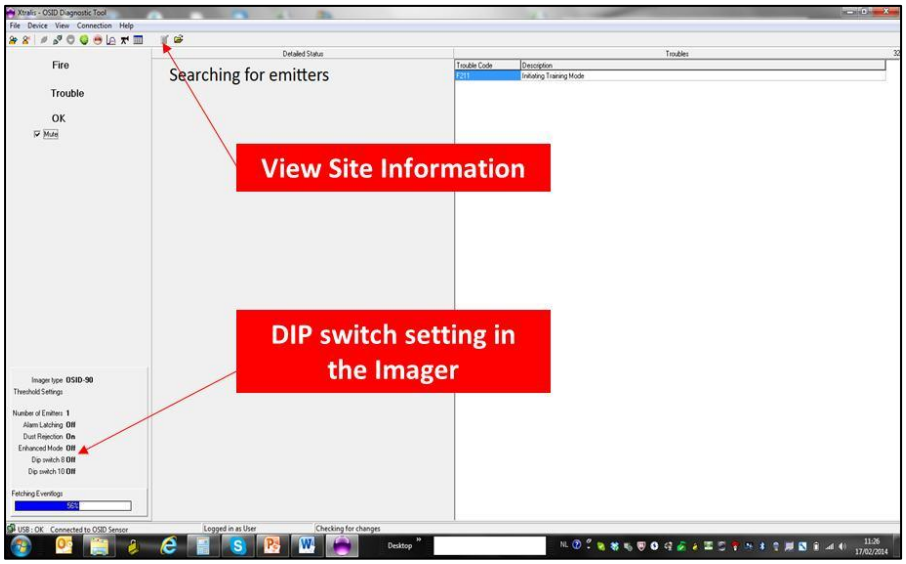
Certain improvements in V.4.00.3 may only be visible if the log was downloaded with V3.00.4 SW. Analysing existing logs downloaded with earlier version may still show discrepancies in time and date.

2.2.1 Icons in the task bar



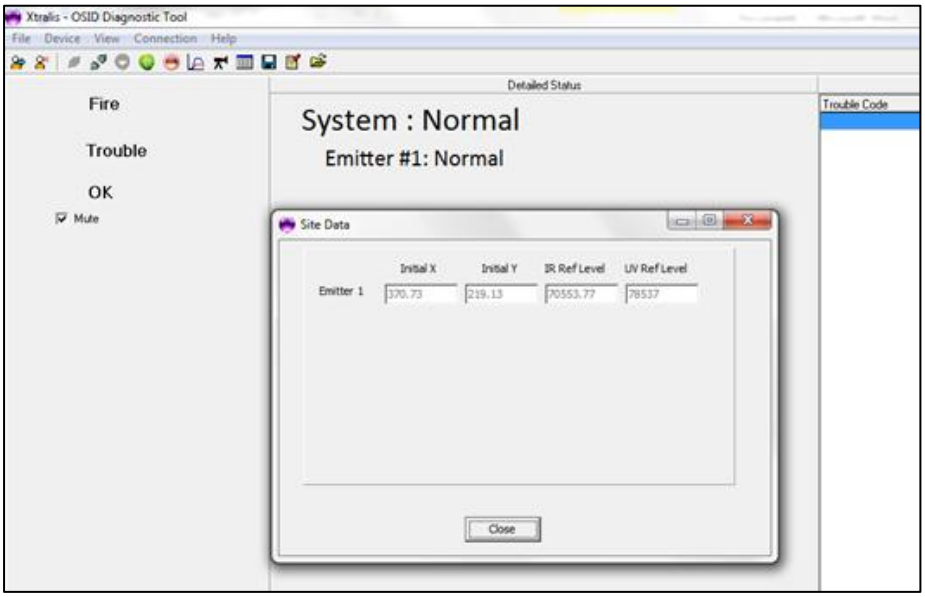
2.2.2 Connecting the PC

When connecting the PC you find the following info.



The tool reflects the DIP switch settings in the Imager so one can quickly assess if the settings are those that were meant to be set.

You also find the type of detector. This allows a quick assessment if the right type of Imager was chosen for the specific distance.

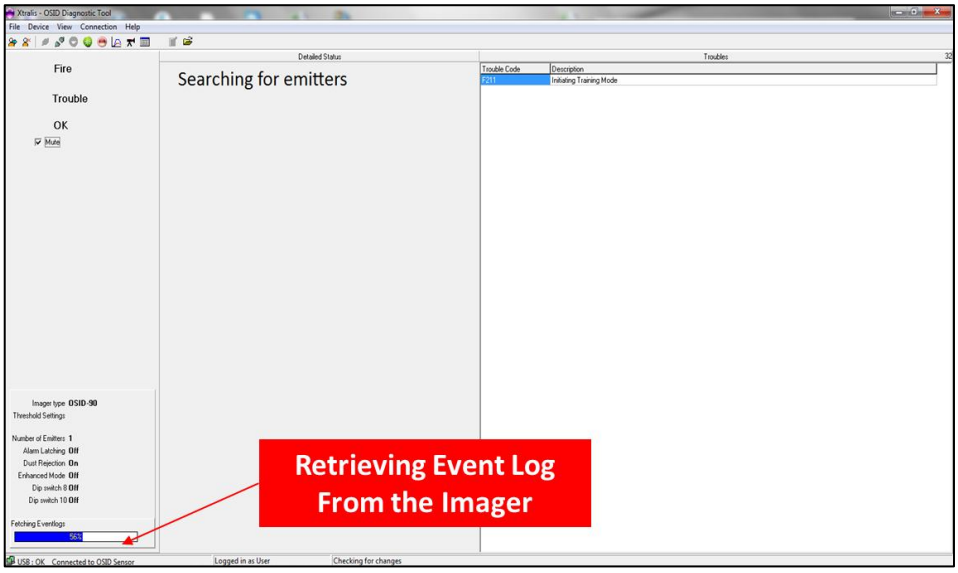


When clicking the View Site Information icon a screen is displayed showing the initial settings of the Imager at last start up. The initial reference level information is convenient for predicting the date of the next maintenance. If the Imager has been regularly powered down in its life time this information is less relevant for the true contamination of the lenses as the zero level gets re-established at every power up.

To measure contamination you need to compare this initial reference level to the current reference level in the graph. If re-commissioning is required, it is preferred to use the re-commission button in the Diagnostic SW. Reason being, that **hitting the re-commission button in OSID Diagnostic doesn't cause the Imager to lose the time in the event log**.

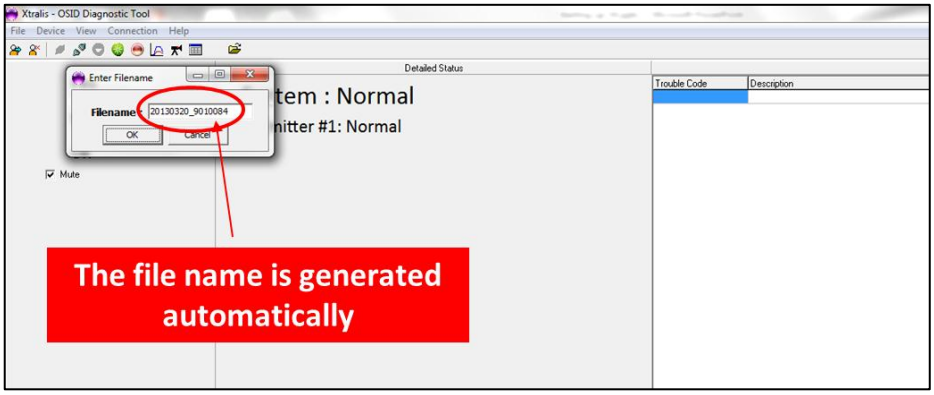
The X-Y initial position versus current positions indicates if the Imager and/or Emitter have been significantly moved.

2.2.3 Retrieving the event log



When connecting the PC, from V3.00.4 onwards**,** the event log is now automatically downloaded and saved. The progress can be monitored on the *Fetching Eventlogs* bar graph. This can go very quickly, hardly noticeable, if the there is little data in the log.

Before saving, the following screen appears.



The saved file is created in the ***C:*** directory under the folder ***SunshineLog*** and has a format, if not renamed, ***20130329_9002471_Eventlog.dat***. The *eventlog* extension indicates it is the Imager's event log as oppose to the ***20130329_9002471_Livedata.dat*** file that represents the live data log created every time you connect a PC to a commissioned normally operating Imager.

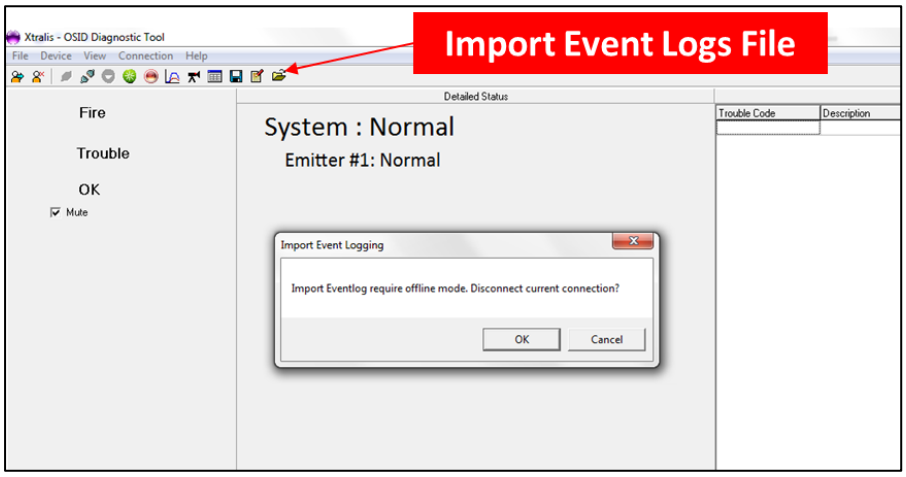
When hitting the save button again, you will be prompted with the question '*Would you like to replace existing file*'. This only happens if you save several times during the same day. Otherwise the software automatically generates a different name using the date.

The event log can also be manually saved when finished working at the Imager. You can also change the name of the event log for ease of administration. It is advised when changing the name to keep the Imager SN number, i.e. 20130329_**9002471**_Eventlog.dat, in the description for easy referencing to the graphs and log.

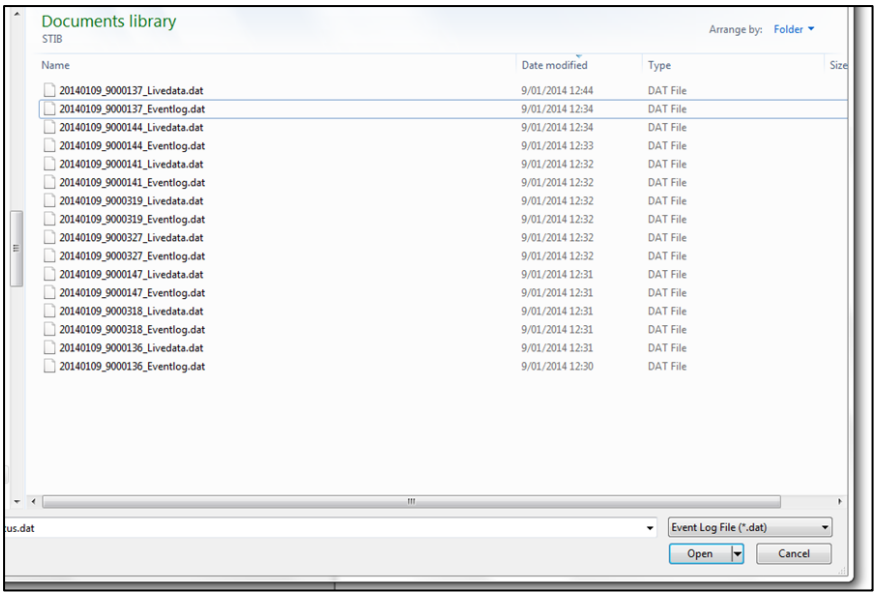
Example: Beam Corridor West - 90023471.

2.2.4 Opening the event log

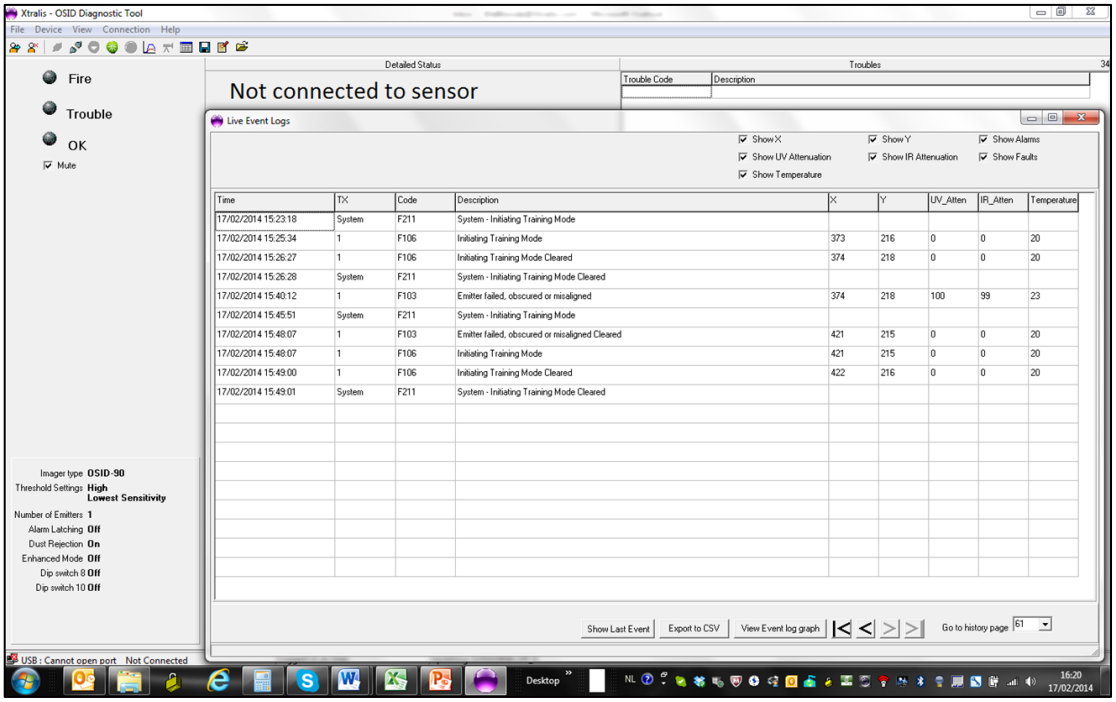
The event log can only be imported when using the PC in off-line mode. You will be prompted to disconnect.



After accepting, the Sunshine log file will open and you can select the specific file. You can only open files with the Eventlog.dat extension. The Livedata.dat files can be sent to the FAE if in-depth analysis is required. These files contain some extra data that are normally not required to analyze field log files.



After selecting the desired file, the event log file will open.



2.2.5 Analysing the event log

The event log contains data regarding IR/UV signals, X-Y positioning of the Emitter(s) on the CMOS Imager and temperature. The tick boxes at the top to select the data you want to be displayed. The **Time** column displays date and time or sequences, or a mix of both.

If the Imager was powered before down before connecting the PC, then only the period between the last power down and the moment of connecting the PC will have date and time stamps. All other events have 0,001 days counter steps/stamps.

The **TX** column displays the originator of the fault and alarm. This can be a System related fault or an individual Emitter related fault and/or alarm.

In case of an Emitter related fault and/or alarm, the exact Emitter will indicated, 1-7.

The **Code** column displays the fault and alarm code and the **Description** column explains the fault type.

For the alarm codes representation:

A1: Normal flaming smoke alarm

A2: Oxygen deprived smoke alarm

A3: 6 dB alarm
Attenuation of 6dB or 75% obscuration reached in 5 seconds must generate an alarm if sustained for 20 sec., requirement of EN 54-12:2002 - section 5.6.

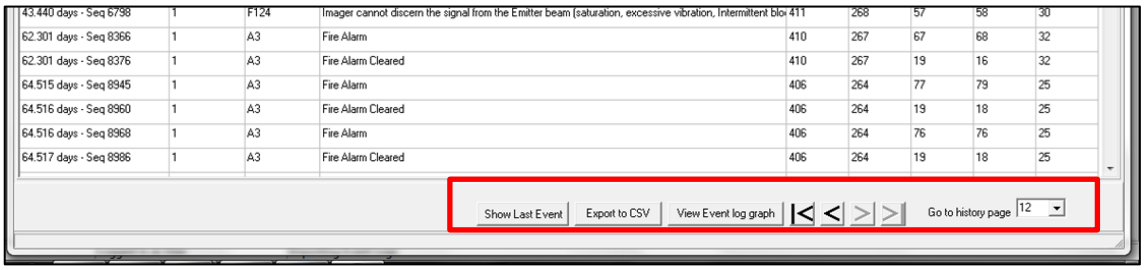
The 6 dB alarm 'can' be turned into a fault rather than an alarm by putting DIP switch 9 to Enhanced mode ON. (This will put the system into an **EN** un-Approved operating state)

NOTE!

OSID Diagnostic can be used offline to open any event log that is saved on your PC.

Click the **Import Event Logs File** icon to do so.

The icons at the bottom allow navigating in the logs, exporting the log and viewing the associated graphs.

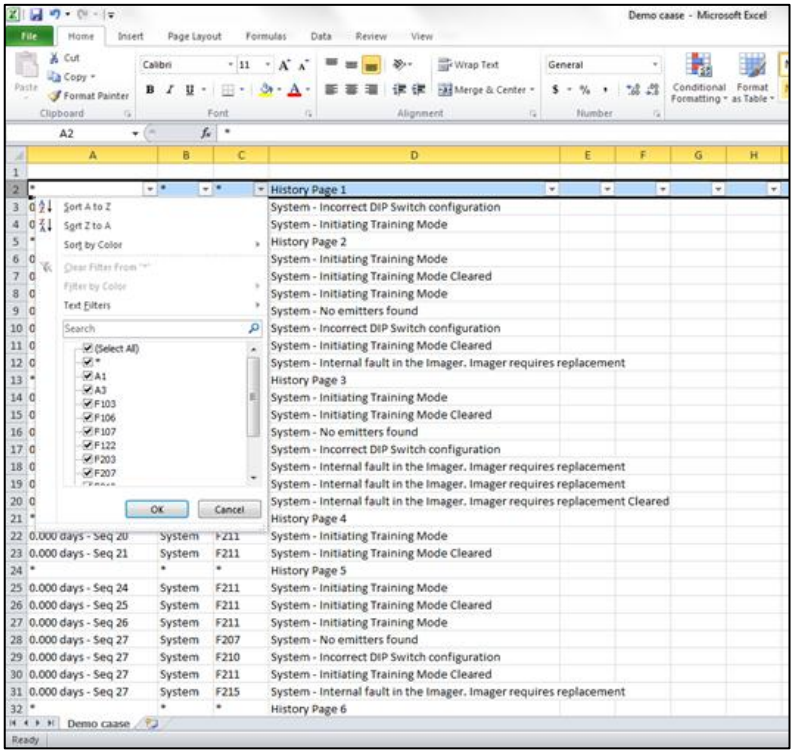


It is very convenient to jump straight from the log to the associated graph to visualize the nature of the event.

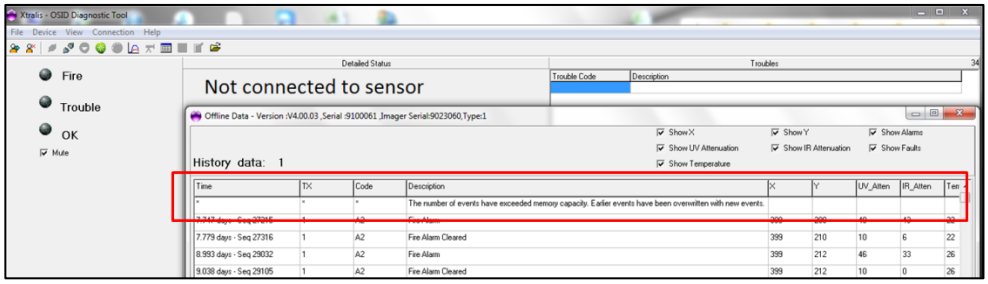
When exporting the log, a .csv is created in the same directory as where the log is situated.

0.006 days - Seq 601		1	F103	Emitter failed, obscured or misaligned	347	249	101	100	22
0.008 days - Seq 602	System		F211	System - Initiating Training Mode					
0.009 days - Seq 603		1	F103	Emitter failed, obscured or misaligned Cleared	354	179	0	0	20
0.009 days - Seq 603		1	F106	Initiating Training Mode	354	179	0	0	20
0.010 days - Seq 608		1	F106	Initiating Training Mode Cleared	354	179	0	0	20
0.010 days - Seq 609	System		F211	System - Initiating Training Mode Cleared					
0.013 days - Seq 613		1	A1	Fire Alarm	355	180	100	8	22
0.017 days - Seq 618		1	A1	Fire Alarm Cleared	354	178	1	0	22
*	*		*	History Page 23					
0.000 days - Seq 709	System		F211	System - Initiating Training Mode					
0.001 days - Seq 712	System		F211	System - Initiating Training Mode Cleared					
0.001 days - Seq 714		1	F106	Initiating Training Mode	355	180	0	0	20
0.001 days - Seq 715	System		F211	System - Initiating Training Mode					
0.002 days - Seq 719		1	F106	Initiating Training Mode Cleared	355	180	0	0	20
0.002 days - Seq 720	System		F211	System - Initiating Training Mode Cleared					
1.943 days - Seq 754		1	A3	Fire Alarm	355	180	78	70	22
1.949 days - Seq 760		1	A3	Fire Alarm Cleared	355	180	0	0	23
*	*		*	History Page 24					
0.000 days - Seq 836	System		F211	System - Initiating Training Mode					
0.001 days - Seq 840		1	F106	Initiating Training Mode	354	180	0	0	20
0.002 days - Seq 844		1	F106	Initiating Training Mode Cleared	354	179	0	0	20
0.002 days - Seq 845	System		F211	System - Initiating Training Mode Cleared					
*	*		*	History Page 25					
0.000 days - Seq 915	System		F211	System - Initiating Training Mode					
0.001 days - Seq 918		1	F106	Initiating Training Mode	354	179	0	0	20
0.002 days - Seq 923		1	F106	Initiating Training Mode Cleared	353	179	0	0	20
0.002 days - Seq 924	System		F211	System - Initiating Training Mode Cleared					
*	*		*	History Page 26					
8/11/2013 23:08	System		F211	System - Initiating Training Mode					
8/11/2013 23:10		1	F106	Initiating Training Mode	354	180	0	0	20
8/11/2013 23:11	System		F211	System - Initiating Training Mode Cleared					
8/11/2013 23:11		1	F106	Initiating Training Mode Cleared	354	180	0	0	20

By applying a filter in the .csv file one can quickly check for specific faults and alarms. This tool is very convenient for creating reports.



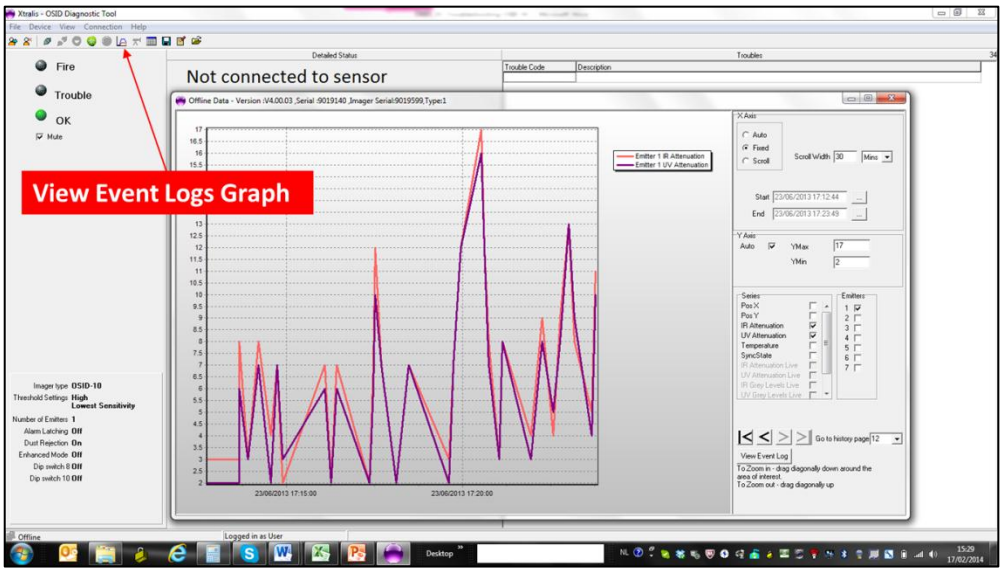
In case the event log was full and has been overwritten with new events, the message below will be shown.



The log itself may contain only few alarms and faults but has been overwritten because of the many 'significant changes' (see 2.2.6) exceeding the 10k entries. One event can have several causes so the log file may have over the 10k lines.

2.2.6 Creating graphs from the event log

Once the event log is open the content can be graphed by clicking the **View Event Logs Graph** icon.



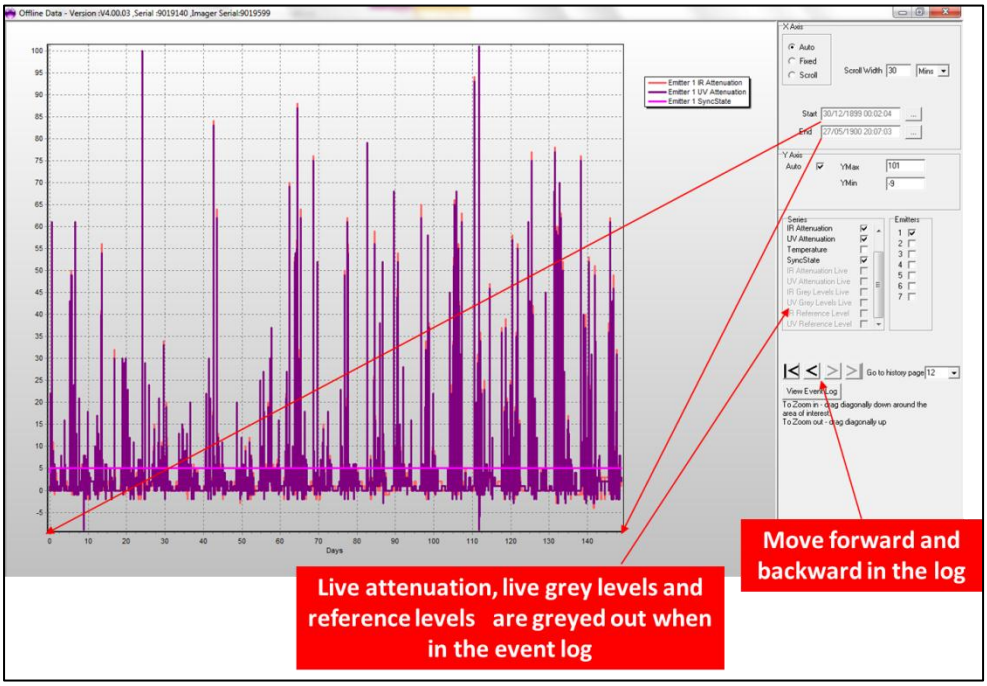
Depending on the number of events that have occurred, the graph can look 'spikey'. The reason is that only significant changes are logged opposite to a continuous logging (2 logs/sec) when a PC is permanently connected.

A change is significant if:

- UV or/and IR change: ≥ 5%
- X or/and Y position: ≥ 2 pixels
- Temperature: ≥5°C/41°F

For ease of viewing, the events are connected with a line. So if there is little change happening one will get this type of graph. A steadily building fire on the other hand will generate faster changing values and the event graph will look a lot smoother, very similar to the live graphs.

How to understand and change the settings in the graph field?



History data: n

Each time the Imager is powered down a new *history data* block is created.

As in this example the Imager was powered down, it explains why there is no date and time stamp.

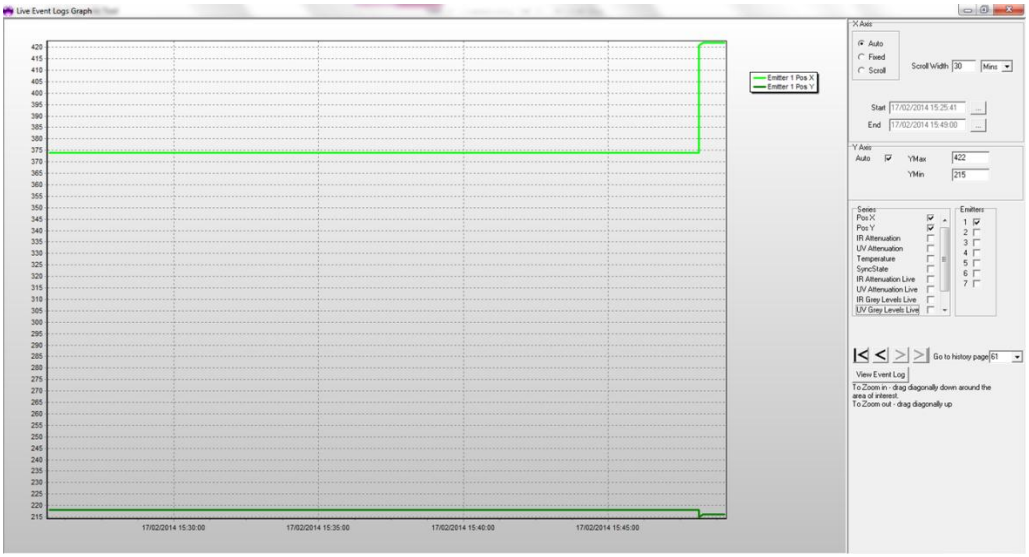
When moving forth and back in the log with the arrow keys (**< >**) it is quite possible that a number of history blocks are empty. This means that NO significant changes happened between the power-down periods.

Zoom in/out

Dragging diagonally up and down allows zooming in and out around the zone of interest

By clicking and holding the right mouse button the graph can be moved around the screen for better visualisation.

Graphing x-y position



In this example the Imager moved significantly in the horizontal position. In most cases where the Imager/Emitter(s) are mounted on a stable surface both lines will be just flat.

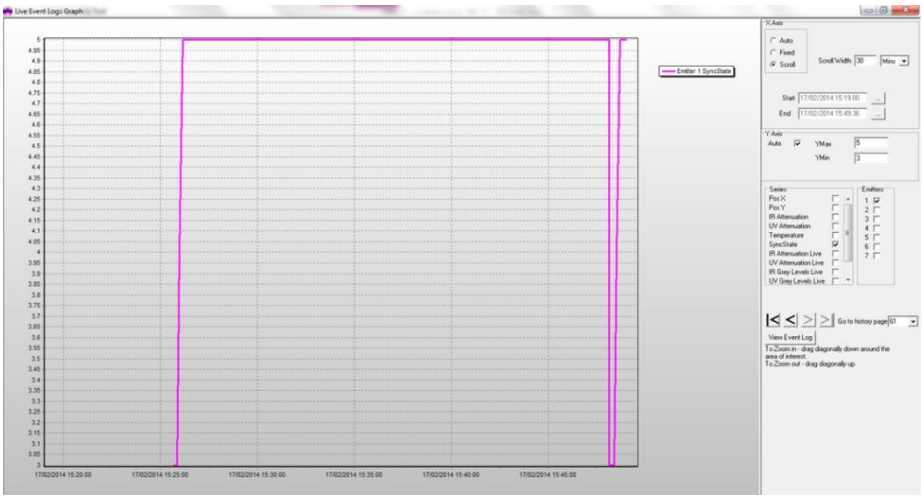
This does not mean that nothing moved at all but that the change was not significant and hence a straight line connects the first and last reading.

SyncState

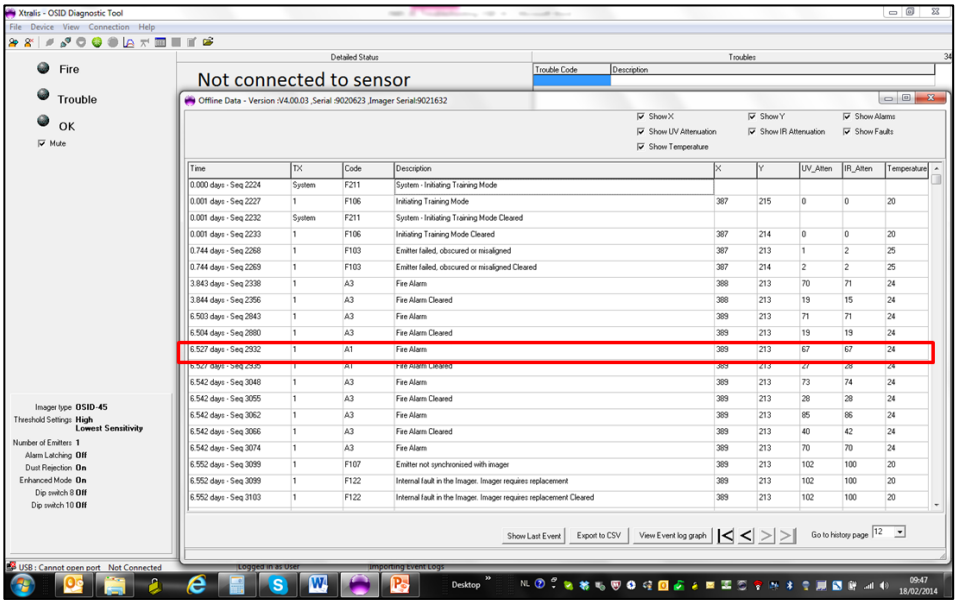
There are different Synchronisation States.

1. Emitter lost
2. Initial state
3. Emitter found and synchronising
4. Emitter synchronisation is settling
5. Emitter synchronisation locked and settled (all is OK)

As an example, synchronisation will be lost when Emitters are 100% obscured for a period exceeding 1 minute.

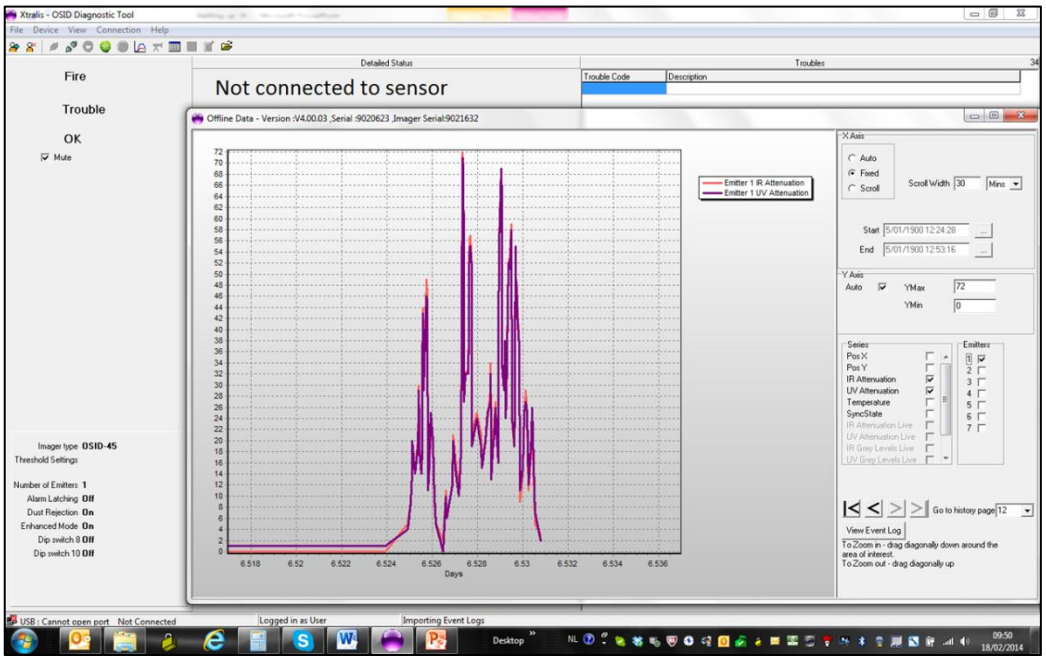


It is also possible to view a single particular event when in the log.
To do so, double click anywhere in the specific line.



The specific graph will now open for evaluation.

You can now zoom in further for in-depth viewing.



3 Imagers on site that are not equipped with latest V4 firmware

When connecting, OSID Diagnostic will want to upgrade firmware that has a different/lower firmware version. All Imagers with firmware from **V3.57.05** onwards can be upgraded to V4.

There may be units in the field from the really early days that cannot be upgraded with the latest tool. In this event a **Version Compatibility Mismatch** message appears on the screen. Contact your FAE for help. In all other cases the firmware will upgrade automatically.

The Password is: **1413.**

Just follow the upgrade process on the screen.

NOTE!

V4 does not require a restart/power down-up of the Imager to install. The system will automatically upgrade the firmware without any human interaction so be patient and wait until the system indicates the firmware upgrade was successful.

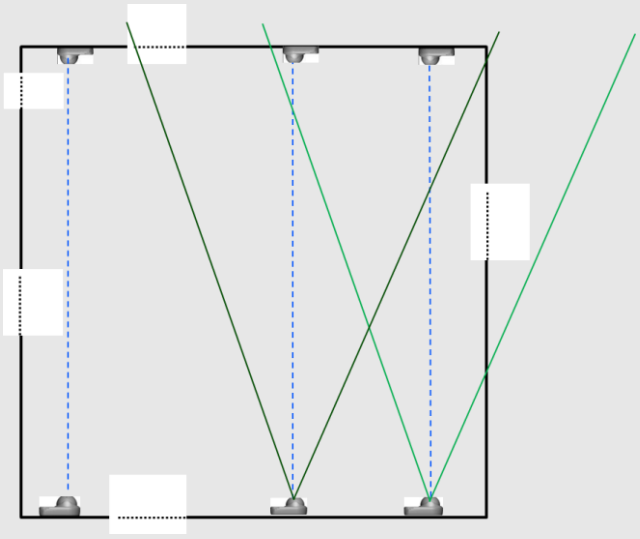
NOTE!

Upgrading multi-emitter sites

90°or 45°imagers can have unwanted emitters in the line of sight specifically when used for 1 on 1 systems.

Imagers will automatically reinitialize after a software upgrade, so unwanted emitters need to be blocked when doing the upgrade

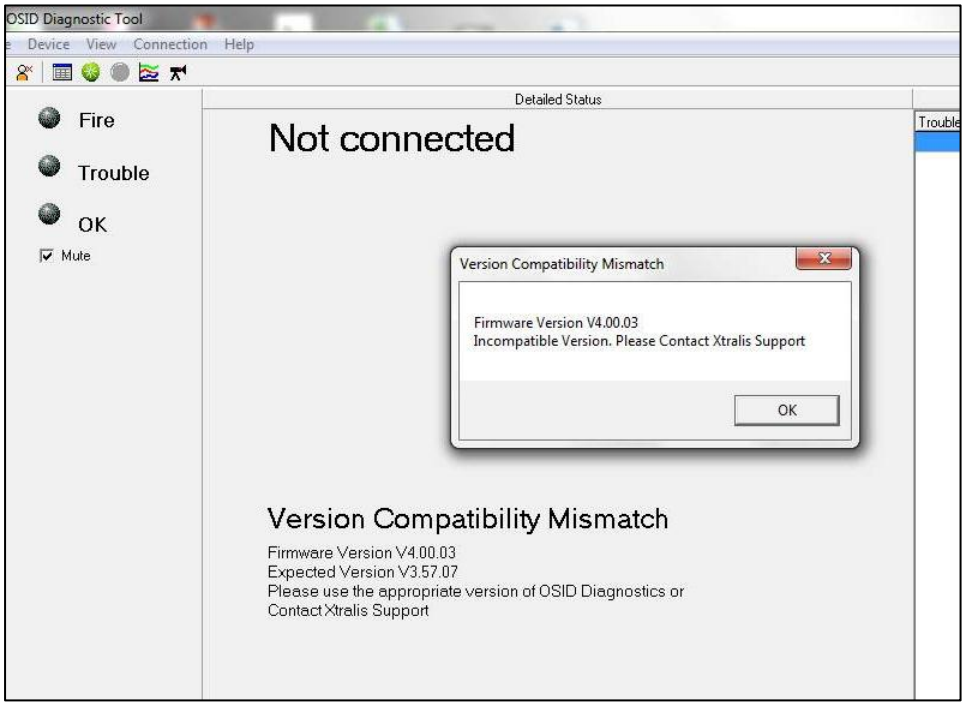
After the upgrade the imager will remember its own emitter(s) and the position(s), even after a power down.



4 Using earlier OSID Diagnostic versions

It is not possible to downgrade firmware to earlier versions.

When accessing an Imager with a Diagnostic tool that holds an earlier version of firmware the following message will be displayed:



In this case the Diagnostic Tool cannot be used.

The latest version of the Diagnostic Tool is always available at the Partner section of the Xtralis website www.xtralis.com. You will find this SW under OSID by Xtralis- section Software.

5 Troubleshooting on-site using OSID Diagnostics

5.1.1 View static video image

In addition to a clear description of the trouble code(s) the engineer can also acquire an image of what the Imager actually 'sees' and find the location of the Emitter(s) in the Imagers field of view.

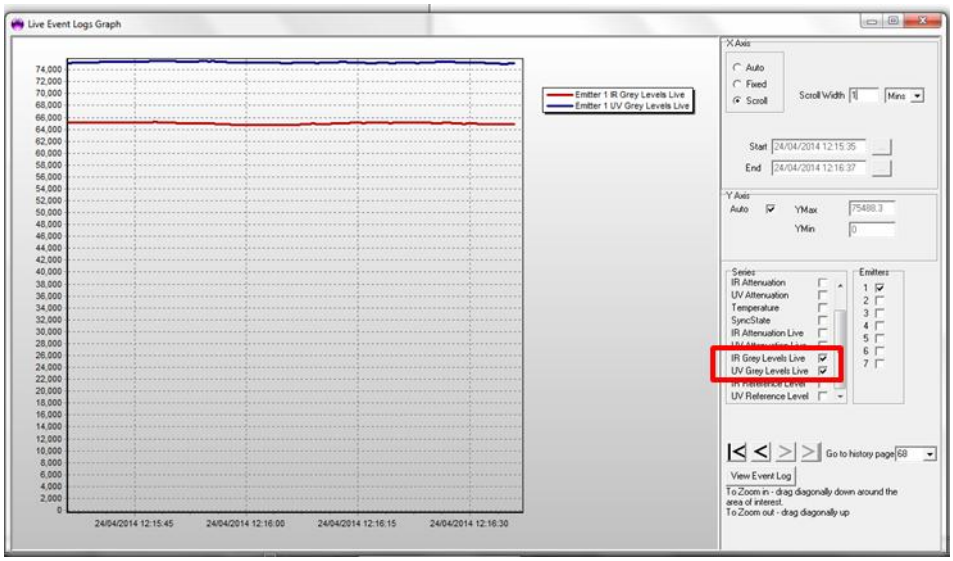
Any Emitter in fault will be indicated by a yellow icon, Emitters that are OK will have a green icon and Emitters in alarm with a red icon.

5.1.2 View grey levels

There can be a number of reasons why the Imager is not or no longer seeing it(s) Emitter(s).
As stated in 5.1.1, the position of the Emitter in the picture is only a measure for the quality of the alignment of the Imager. The quality of alignment of the Emitters can be checked through the live grey levels.

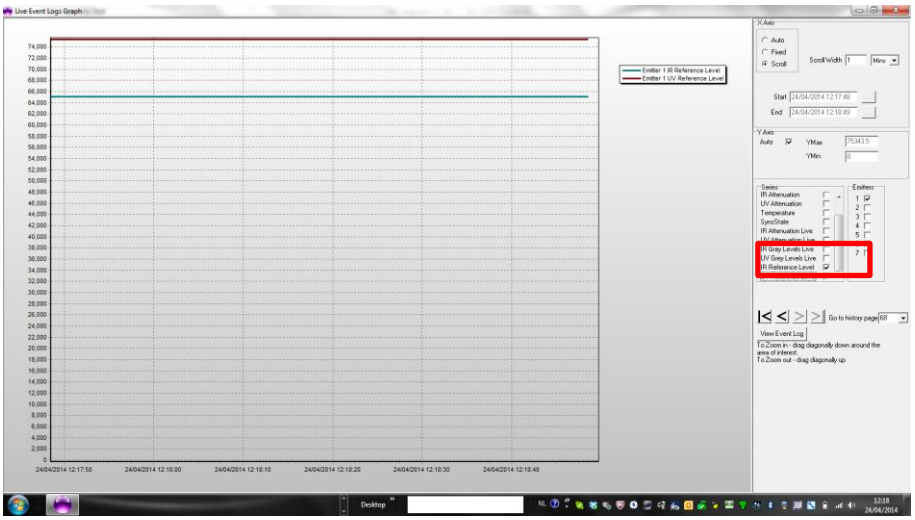
The grey levels are only shown when the OSID Diagnostic is connected to a live Imager/system.
The value of the grey levels depends on the distance between Imager and Emitters as well as on the quality of the alignment.
1600 grey levels for IR and UV is the absolute minimum amount of grey levels required for the correct functioning a system.

A level of +100000 is quite common for short distance systems. The value drops rapidly below 10000 levels when approaching maximum distance.
By checking the grey levels, the installer can measure how much he has improved the alignment of the Emitter(s) in case a fault occurs or the commissioning does not get completed.



5.1.3 View Reference levels

The graphs indicate the current value of the reference level.
Comparing these levels to the initial reference levels, see 2.2.2, allow predicting maintenance intervals. One can now calculate when the 20% signal loss that will generate a maintenance fault is to be expected.



5.2 The fault messages

Below are the most common fault codes that have relevancy in the on-site fault finding process.

5.2.1 System Fault codes

NOTE!

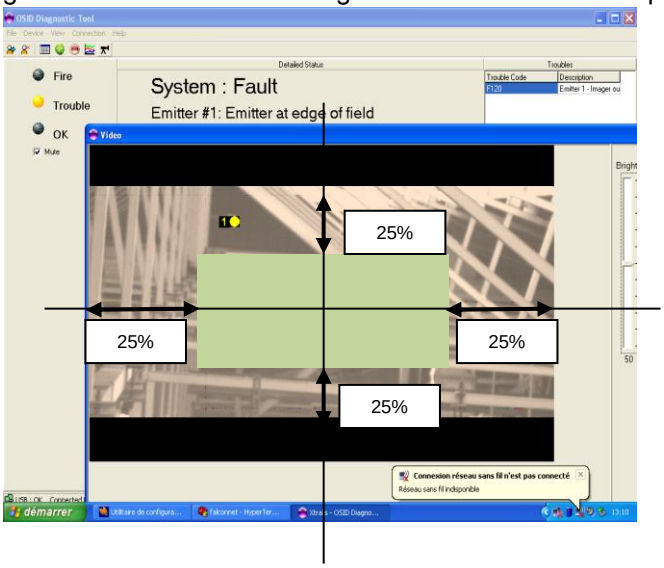
"***Internal fault in the Imager. Imager requires replacement***". The detailed nature of these codes is not relevant for the fault finding process. These faults are extremely rare and are listed here for the sake of completeness.

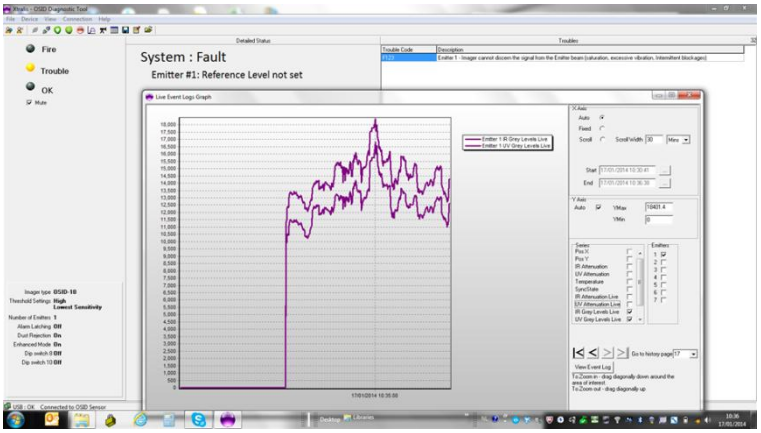
Code	Fault	Description
201	Config Load Failure	Internal fault in the Imager. Imager requires replacement
202	Config Save Failure	Internal fault in the Imager. Imager requires replacement
203	Firmware RAM Corrupt	Internal fault in the Imager. Imager requires replacement
204	Firmware Flash Corrupt	Internal fault in the Imager. Imager requires replacement
205	NAFFS Corruption	Internal fault in the Imager. Imager requires replacement
206	Data RAM Fault	Internal fault in the Imager. Imager requires replacement
207	No Emitters found	No Emitters have been detected
208	Not enough Emitters	Too few Emitters have been detected compared to the configured number set
209	Too Many Emitters	Too many Emitters have been detected compared to the configured number set
210	DIP Switch config bad	DIP switches are set incorrectly (alarm level is not set, number of Emitter(s) are not set, more than one Emitter is set for an OSID 10 degree Imager). **The Imager will not initialise as long as all DIP switches are set to 'zero'**
211	Commissioning not completed	System has not correctly initialised during Training Mode
212	Imager Pixel Failure	Internal fault in the Imager. Imager requires replacement
213	Imager Card Version Conflict	Internal fault in the Imager. Imager requires replacement
214	FPGA Version Conflict	Internal fault in the Imager. Imager requires replacement
215	Term Card Version Conflict	Internal fault in the Imager. Imager requires replacement
216	Supervisor Version Conflict	Internal fault in the Imager. Imager requires replacement
217	External Reset Overuse	Excessive reset of +30 resets in 60 sec.
218	System Cal File Load Failure	Internal fault in the Imager. Imager requires replacement
219	Imager Cal File	Internal fault in the Imager. Imager requires replacement

Code	Fault	Description
	Load Failure	
220	Failure to process video	Internal fault in the Imager. Imager requires replacement
232	Internal Fault/software exception	Internal fault in the Imager. Imager requires replacement

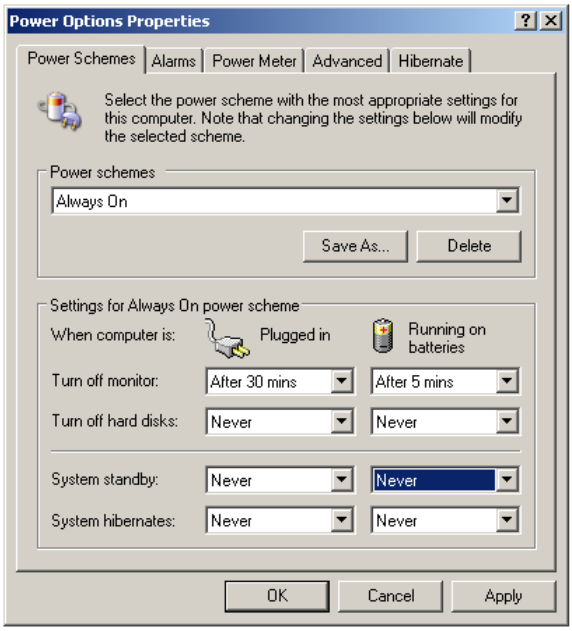
5.2.2 Emitter fault codes

Code	Fault	Description
101	Signal too Low	Emitter range fault. Emitter is too far away
102	Emitter obscured	Occurs when there are blockage(s) of the light beam between the Emitter and the Imager that are not smoke types, sustained for a certain period and causes a medium attenuation
103	Object intrusion	Occurs when there are blockage(s) of the light beam between the Emitter and the Imager that are not smoke types and that are sustained for a short period and cause a large (almost total) attenuation. An Imager or Emitter severely displaced with misalignments larger than the tolerated amount as specified in OSID Product Guide may also cause an object intrusion fault.
104	Reference Level drifted high	Signal has become much stronger than at initialisation. System is possible badly aligned or was started up in a dusty atmosphere that has now disappeared.
105	Reference Level drifted low	Contamination fault. Emitter and Imager require cleaning, 20% of initial signal strength is lost. After cleaning the lenses, when the reference level gets tracked upwards, the fault signal will disappear in 1- 10 minutes, The time is depending on how far down the level was.
106	Commissioning not completed	System has not correctly initialised during Training Mode
107	PLL not locked	Emitter and Imager have not succeeded in synchronising
108	Imager alignment drift	Imager out of alignment
110	Signal too High	Emitter range fault. Emitter is too close
111	Emitter alignment drift	Emitter out of alignment
112	Emitter battery life warning	Emitter battery is 13 month or less from its end of life
113	Emitter battery expired	Emitter battery has reached end of commercial life (5 years)
114	Emitter type not supported	Emitter type mismatch. Emitter type is not recognised by the receiver
115	Imager bias of range	Imager saturation,
116	Imager Saturation	Imager cannot discern the signal from the Emitter beam (saturation)
117	Image blocked or unstable	Imager cannot discern the signal from the Emitter beam (intermittent blockages/excessive vibration-missing frames)
118	Emitter battery fail urgent	Urgent fault, check for direct sunlight on Emitter. **Can occur with both battery powered and wired Emitters.**
119	Emitter battery fail	Emitter battery is no longer operational
120	Emitter at edge of field	Imager out of alignment

Code	Fault	Description
		NOTE! Edge of field alignment with 10° Imagers. The opening angle or field of view of an OSI-10 is a lot less than the FOV of a 45° or 90° Imager. In fact an OSI-10 has 7° horizontal and 4° vertical field of view versus 38° and 19° for OSI-45 and 80° and 48° for an OSI-90. Whilst the 7° and 4° are comfortably larger than traditional beams, the image presented by OSID Diagnostic can be misleading. Because the angles are less 'tolerant' than 45 and 90° Imagers, an Emitter with OSI-10 needs to be positioned in the 'green' area of the Imager as shown below. If positioned outside the green area an 'Emitter at Edge of Field' fault will be displayed.  For the OSI-10, that acceptable alignment criteria is X: 160 to 592, Y: 160 to 320, with the centre being 376, 240. The X-Y position numbers in the event log can be compared to judge the alignment quality. **This only reflects the quality of the alignment of the Imager, not the Emitter!**
121	Ref Level low	Contamination fault. Emitter and/or Imager require cleaning. Received Imager power level too low.
122	Video process failure	Dark video image, likely to be caused by object Intrusion
123	Reference Level not set	Reference Level not set due to saturation, excessive vibration or intermittent blockages. Emitter and Imager have not succeeded in synchronising due to inability of setting the reference levels ***NOTE!*** Vibration at the time of commissioning. The Emitters and Imagers must be installed on a solid structure to minimize movement and vibration. Whilst the system copes well with vibration in operational conditions, it is important that the system is as stable as possible during the commissioning process. The tolerance is much tighter at start up because the initial starting point of the reference level has to be known as

Code	Fault	Description
		precisely as possible. Mind that the reference level is the bases for the drift high and low faults and hence for signaling the contamination faults and others as adequate as possible. Coarsely put, the reference level will set if during the commissioning period minimum a third of the measured values fall within 25% of the peak values. This is of course hard to judge with the naked eye but if the grey values go explicitly up and down with a high variation, it is unlikely that the reference level will set like in the example below.  The system only tries once to set the reference level at start up. If it fails to set the level one has to restart manually till the reference level is set. In case of heavy vibration and the level does not set, try fixing the units better and/or start up in a quiet period.
124	Outlier count too high	Intermittent attenuation changes. Imager cannot discern the signal from the Emitter beam (vibration – object repeatedly in/out beam path)

5.3 Leaving the PC for logging purposes on site



To collect more detailed data than the data stored in the on-board event log of the Imager, a PC running OSID Diagnostic can be left on site to record data at a rate of 2 samples a second to allow for an in-depth analysis of the site.

A trial system can be set up quickly as the Imager can be powered from the USB port.

Remember to adjust the power options on the PC.

Typically a PC goes in to sleep mode when left alone and will hence stop logging. Valuable data will be lost in this way.

Do make sure that the hard disc is never turned off nor that the system hibernates.

Experience learns that laptop PCs have trouble maintaining long term communication through a USB port.

It is advised to restart the PC and OSID Diagnostic at least every 2 weeks.

6 Some typical causes of specific faults or alarms

As indicated earlier some faults are very obvious while others may be harder to diagnose and find the cause.

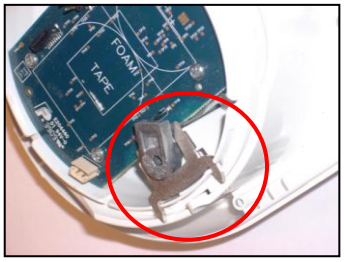
Below are some experiences from the field of what typically can go wrong with first installs or new engineers on the job.

6.1 Align and fully engage eyeball

The easiest way to align a unit is to hold the eyeball with one hand whilst steering with the laser screwdriver with the other hand.

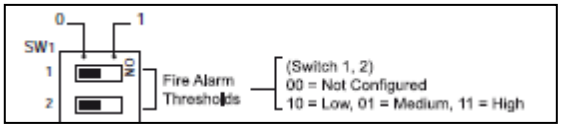
Align slightly above the target spot as the eyeball will tilt down a little when locked.

First time users may be too cautious and wanting to avoid damage to the units that they fail to fully engage the 90° clockwise, locking mechanism of the eyeballs.



This potential problem is a bit easier to see with Emitters as there is a small area where the magnet is partially in front of the reed switch, just enough to start the Emitter flashing. The metal pins that grip into the plastic are just not engaged enough to securely lock the eyeball. While the system looks OK, vibration may cause the eyeball to loosen so that the Emitters and/or Imagers are not aligned anymore and a fault condition is generated.

6.2 Sensitivity settings



The description in the manual can be misleading for first time users.

Lowest threshold means Highest Sensitivity and a High threshold refers to the Lowest Sensitivity.

6.3 Initialising

When working on Emitters and/or Imagers, (opening, changing dip switches, etc), make sure that you initialise the system when all is finished and you do not need to touch the units nor their support anymore.

'Fiddling' with units that are initialised may cause bad alignment and hence requiring re-initialising.

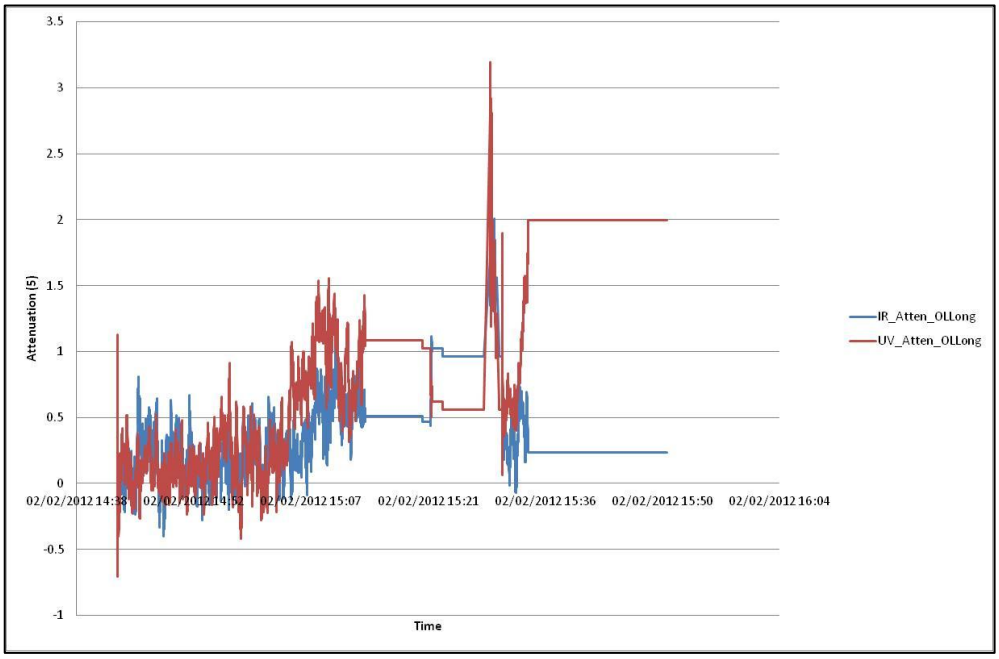
6.3.1 Initialising in temporarily dirty or smoky environments

When using OSID in a dirty environment initialize when the dust levels are low, i.e. night or weekend. This will minimize the risk of getting a 'Reference Level Drift High'. A "Reference Level Drift Low Fault" is less likely to occur because it is compensated for in the Imager over 24 hrs.

6.3.2 Initialising in direct sunlight and in very bright environments

OSID handles light and foreign light sources well due to UV and IR filtering as well background subtraction techniques. Nevertheless when a system is installed in the East-West axis, (this should be avoided as it is not according to the guidelines in the OSID Product Guide) it will at some point in time be exposed to direct sunlight.

Unlike traditional beams, when an Imager is saturated due to direct sunlight exposure, it will signal a fault and not an alarm for the time of the saturation. The fault condition in this case will be "*Imager Saturation*". The graph will show flat lines for UV and IR for the period of saturation as in the screenshot below.



Be aware that also an overexposed Emitter can cause the Imager to saturate. The signal feedback diode in the Emitter will, when 'blinded', force the Emitter to increase power of the UV and IR signals to the point where the Emitter can actually saturate the Imager.

A saturated Emitter will show up in the log as an *Emitter Saturation*.

Saturation faults can be solved by moving the system out of the location where it is being exposed to direct sunlight.

In very bright areas it is advised to use sun shield.

Sun shields only work with OSI-10 Imagers.

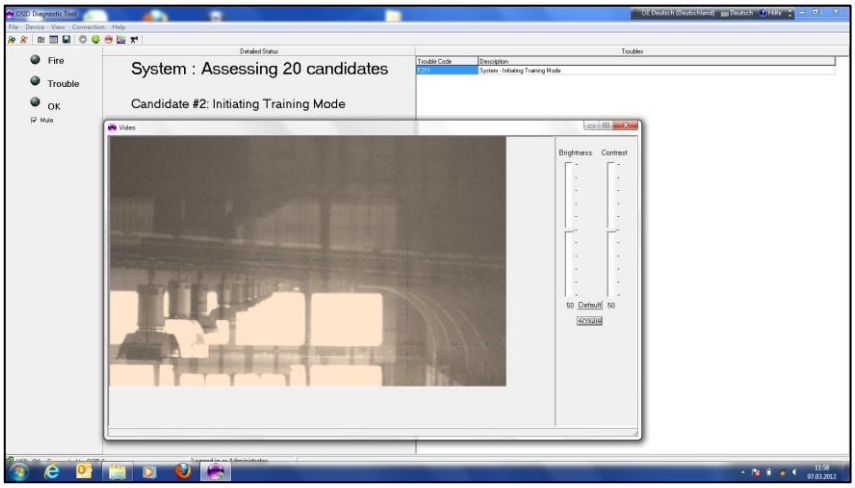
Certain areas, such as depots and warehouses may have large glazed areas. Sunlight can therefore create a very bright background.

NOTE!

It is recommended that Imagers are placed with their back to bright surfaces rather than the Emitters. Avoid Imagers be placed directly on the bright surfaces.

In the event this proves impossible and the Imager faces a bright surface, then initialise preferably when there is maximum light. I.e. initialising when the sun is not present will aid commissioning, but a shorter shutter will be chosen. When light intensity increases, it could cause the system to saturate. Commissioning when it's bright may take longer or not work at all but at least you will know there is an issue or the Imager will choose the shutter for the worst case scenario. A sun shield may proof to be the solution.

In the case that many shiny surfaces are present, you will face a longer initialisation period as normal as these surfaces generate extra candidates. Below you see an example of an OSI-10 in such condition.



The effect is that there will be many 'Candidates' and not just one. Hence the initialisation will take longer than just a few minutes, even +10 min in certain cases.

Just continue with commissioning the rest of the system and check back on the Imager later. The Imager will end up locating its Emitter and finalise commissioning in *Normal* state.

6.4 Multiple Emitters in Field Of View (FOV)

6.4.1 OSI-90 and OSI-45

In certain installations an Imager can have one or more Emitter(s) in its FOV that are not meant to be part of this Imager's coverage. This can happen when protecting odd shaped spaces. Cover the Emitter(s) that is/are not supposed to be seen by the Imager when that particular Imager initializes.

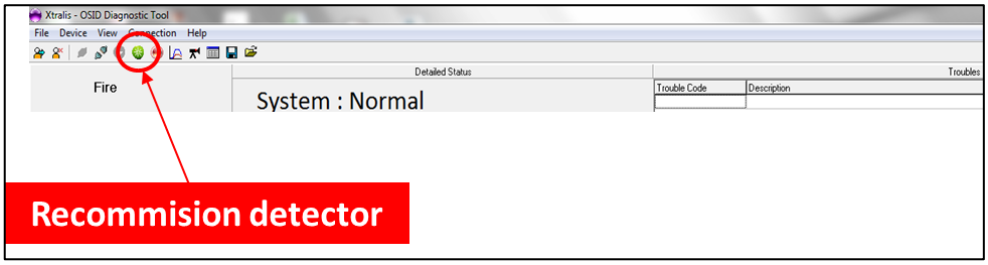
Once the Imager has initialized and identified its Emitters it will ignore any new Emitter in its field.

With V4 SW a new initialization cycle by powering down does NOT require the Emitters to be covered again.

NOTE!

Be aware that clicking the Recommission detector icon will cause the detector to reinitialize and clear its memory. Earlier covered Emitters will be lost from the memory.

If a restart is desired in these circumstances, progress by powering down and up the Imager.



6.4.2 OSI-10

For increased security or double knock purposes 10° Imagers may be installed close to each other.

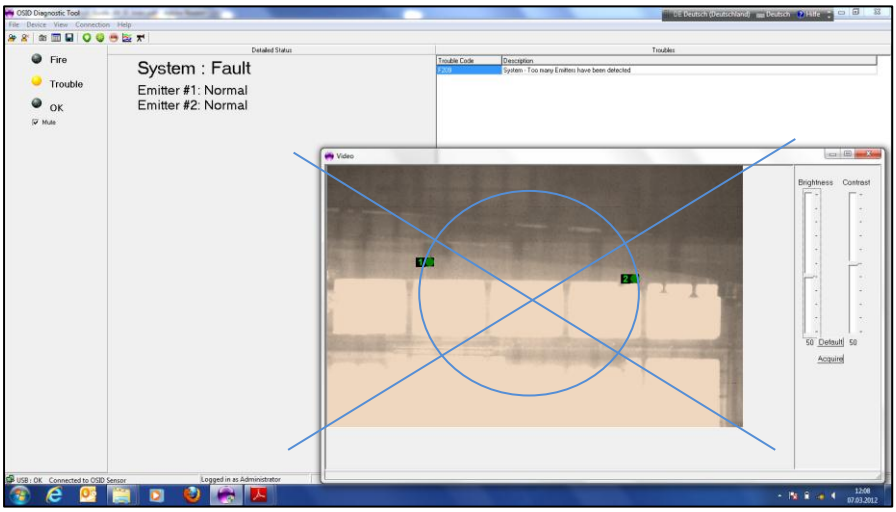
OSI-10 is designed to monitor only one Emitter.

From firmware V4 onwards an OSI-10 will NOT give a '*Too Many Emitters*' fault if multiple Emitters are in its field of view and will now commission only the center most Emitter in the Imager's field-of-view, rejecting all other Emitters.

Given the danger of accidently commissioning the wrong Emitter due to a poorly aligned Imager, the system installation must meet the following conditions for this new mechanism to work.

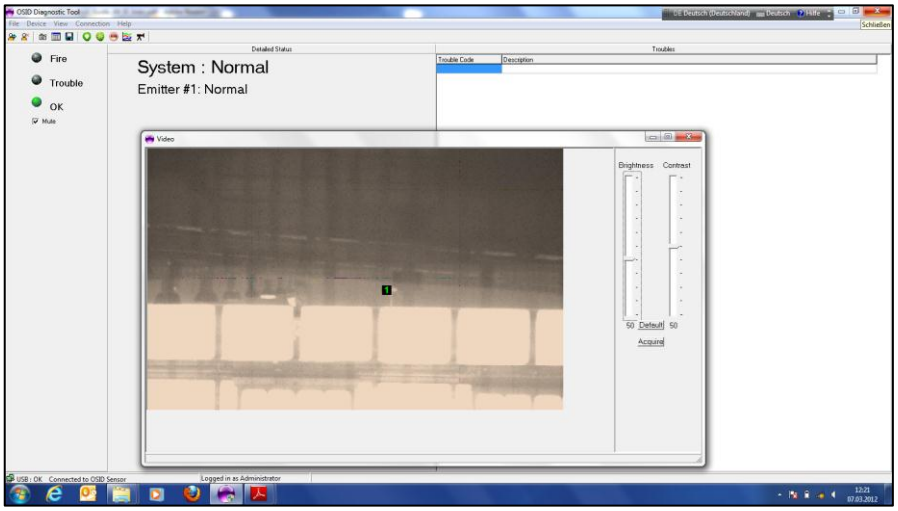
1. The Imager must be aligned to within 1° of the center Emitter.
2. Other Emitters can be placed no closer than ±2.5° of the center Emitter. At 100 m, this corresponds to a minimum Emitter spacing of 4.5 m. At 30 m, this corresponds to a minimum Emitter spacing of 1.5 m.

If these conditions are not met, then the system may consider the scene to be too ambiguous to make a correct decision, and reverts back to existing behavior, which is too commission all the Emitters, see screenshot below.



In such a case the Imager needs to be re-aligned so that it correctly targets its own Emitter. Having done this, the Imager as expected still sees two Emitters and the initialization process continues.

At the end of the process the Imager will accept just the one most centered Emitter and the fault will be cleared.



6.5 Upgrading firmware

Upgrading to V4 firmware does NO longer require power cycling the Imagers.

7 Specific behaviour

7.1 Recovery time

When a beam blockage is longer than 1 minute, the system loses the Phase Lock Loop (PLL). When unobstructed, the system has to re-establish that lock which takes only 1 minute because when re-establishing its PLL the Imager only looks at the areas of interest and not the whole field of view.

When the blockage is under 1 minute, the PLL stays in synchronization, hence recovers immediately when the next flash of light occurs.

7.2 Knock recovery

If an Imager or Emitter is suddenly ‘knocked’ out of its position this may cause an ‘Emitter failed, obscured or misaligned’ fault. After approximately 1 minute the Imager will signal an initialization blink sequence. In reality this is a ‘partial’ initialization as the Imager will only look in the close vicinity of where it remembers the Emitter(s) to have been. If the Emitter happens to be too far out of this initial position, the partial initialization will go on forever without finding the Emitter(s), and also the double blink will continue.

If the knock has not taken the Emitter out of the field of view of the Imager then a full re-initialization, i.e. powered down and up again, will clear the fault. However it is advisable to re-align the device if this should occur

Slow misalignment of the same magnitude will be tracked and not cause a fault, unless the Emitter(s) and Imager are no longer in the field of view.