GRAVINER OMD MK6 SYSTEM

System Overview

OMD MK6 SYSTEM COMPONENTS

Control Panel
(Bulkhead Mount P/N1-53836-K170)
(Flush Mount P/N 1-53836-K206)

Junction Box
(M20 cable P/N 1-53836-K224-xx)
(M25 cable P/N 1-D4720-001-xx)

Straight Cable Connector
(P/N 1-43682-K108-xx)

Right Angle Cable Connector
(P/N 1-43682-K109-xx)

Complete Detector Head
(P/N 1-E3561-301)

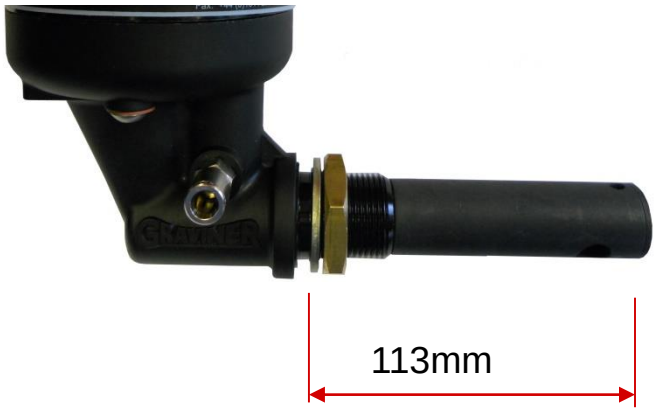
Replacement Detector Head
(P/N 1-D5622-001)

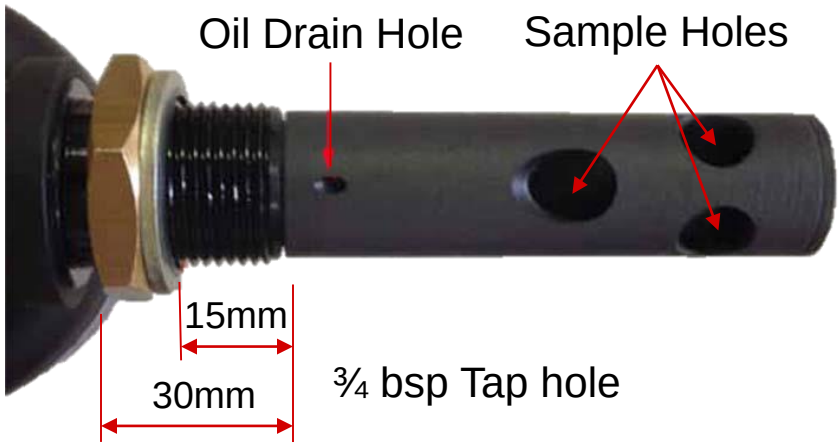
OMD MK6 SYSTEM COMPONENTS

Detector sample pipes (PATENT DESIGN)

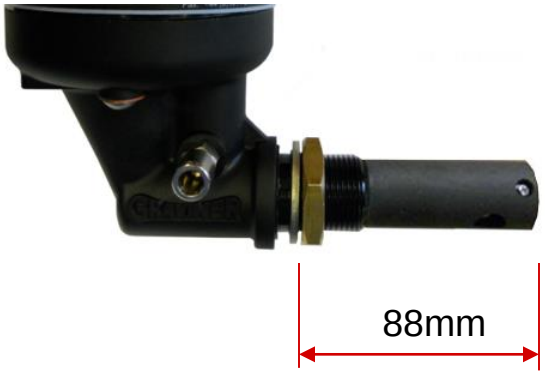
Designed to ensure not blocked by liquid oil.
Oil meniscus unable to form due to hole size.
Carbon loaded PTFE to reduced “stiction”.
Computational Fluid Dynamics (CFD) modelling process to confirm operation.
Extensive oil splash tests performed.
Pipe lengths for engine options.

Standard Sample Pipe





Short Sample Pipe



OMD MK6 FUNCTIONALITY

The detector is mounted on the engine with the detector sample pipe protruding inside the crank space.

The air in the crank space is drawn into the detector by a fan in each detector.

The oil mist level is measured by the detector using light scatter inside the detector sample chamber.

The Control Panel uses an RS485 serial communication's connection to request the oil mist level and status from the detector.

The oil mist level is compared with the alarm levels set in the Control Panel.

OMD MK6 FUNCTIONALITY

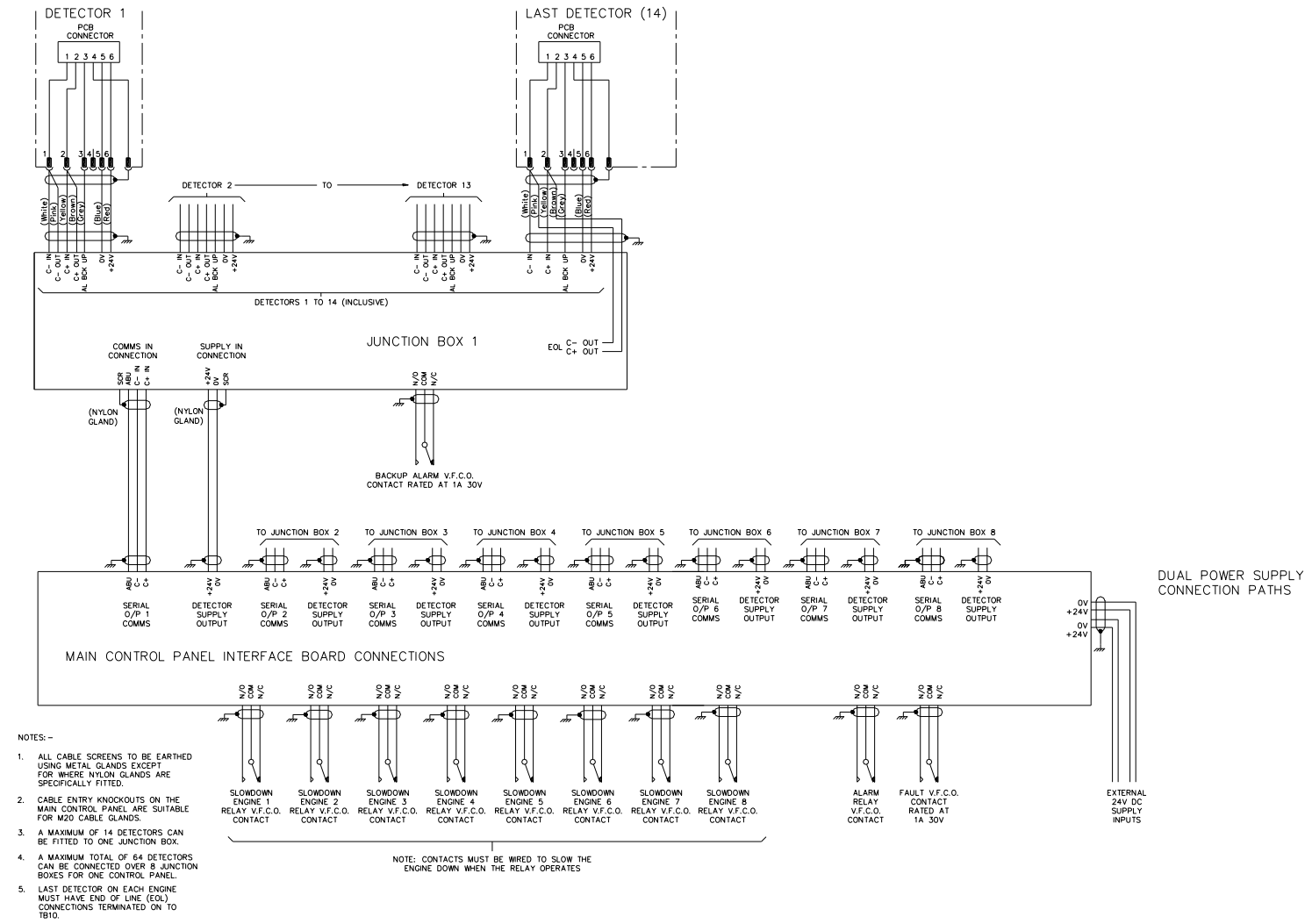
If the measured oil mist level is above the pre defined alarm level the common alarm and shutdown alarm relays are activated.

The system is also monitored to ensure it is functioning correctly. Any failures are indicated as a fault on the Control Panel and the fault relay activated.

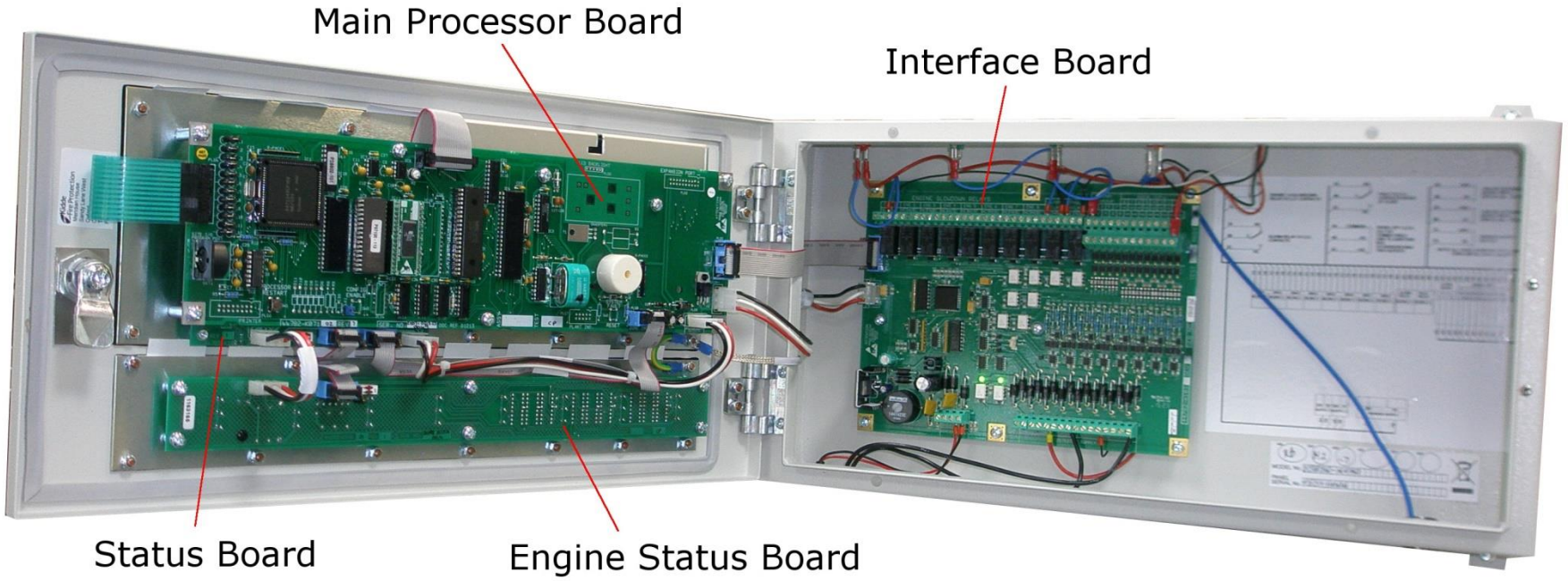
Up to eight engines may be connected to a Control Panel with a maximum of 64 detectors.

With the maximum 64 detectors connected each detectors is scanned by the Control Panel every 1.2 seconds.

OMD MK6 SYSTEM



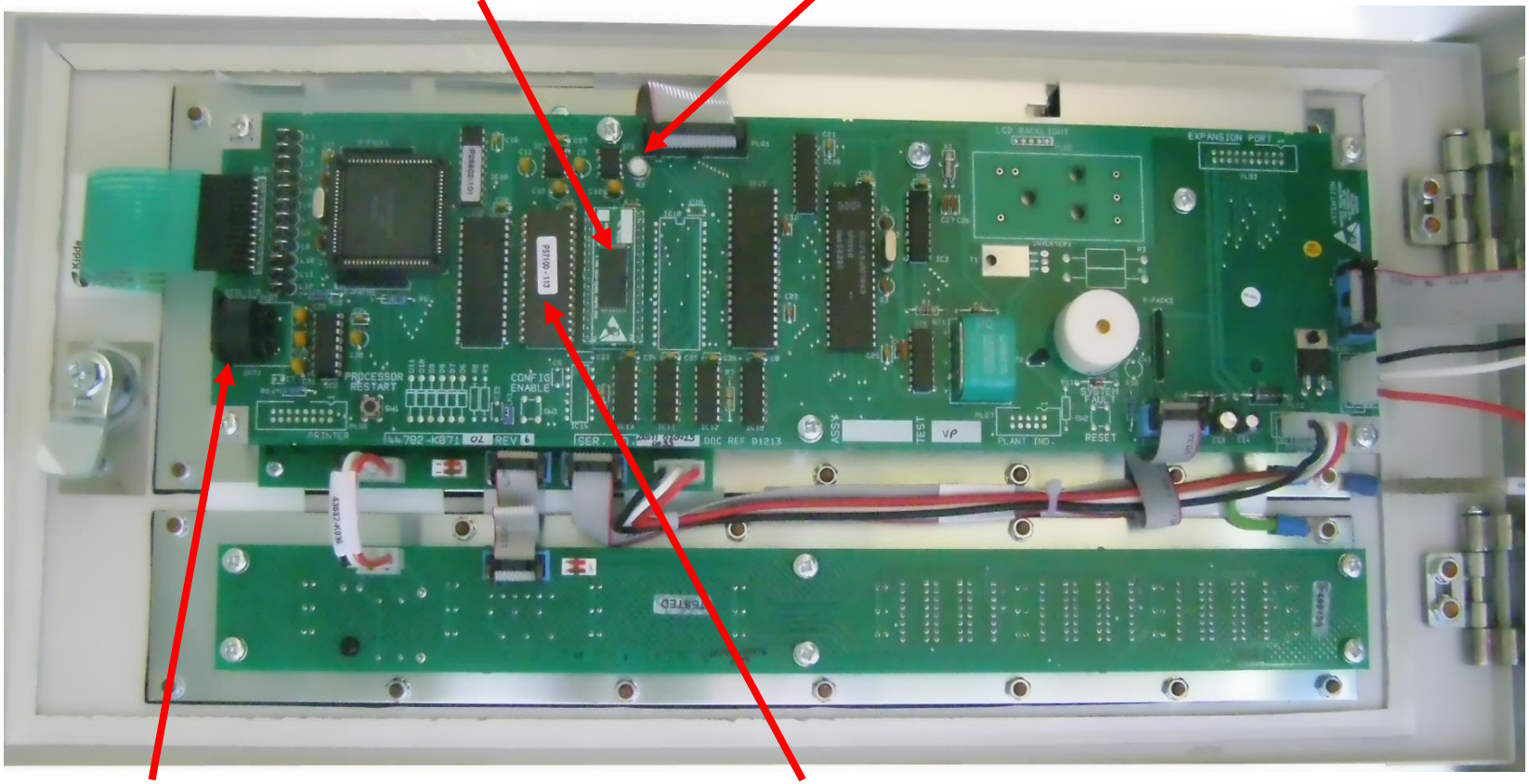
CONTROL PANEL



CONTROL PANEL DOOR

EEPROM
(Configuration & Event-log)

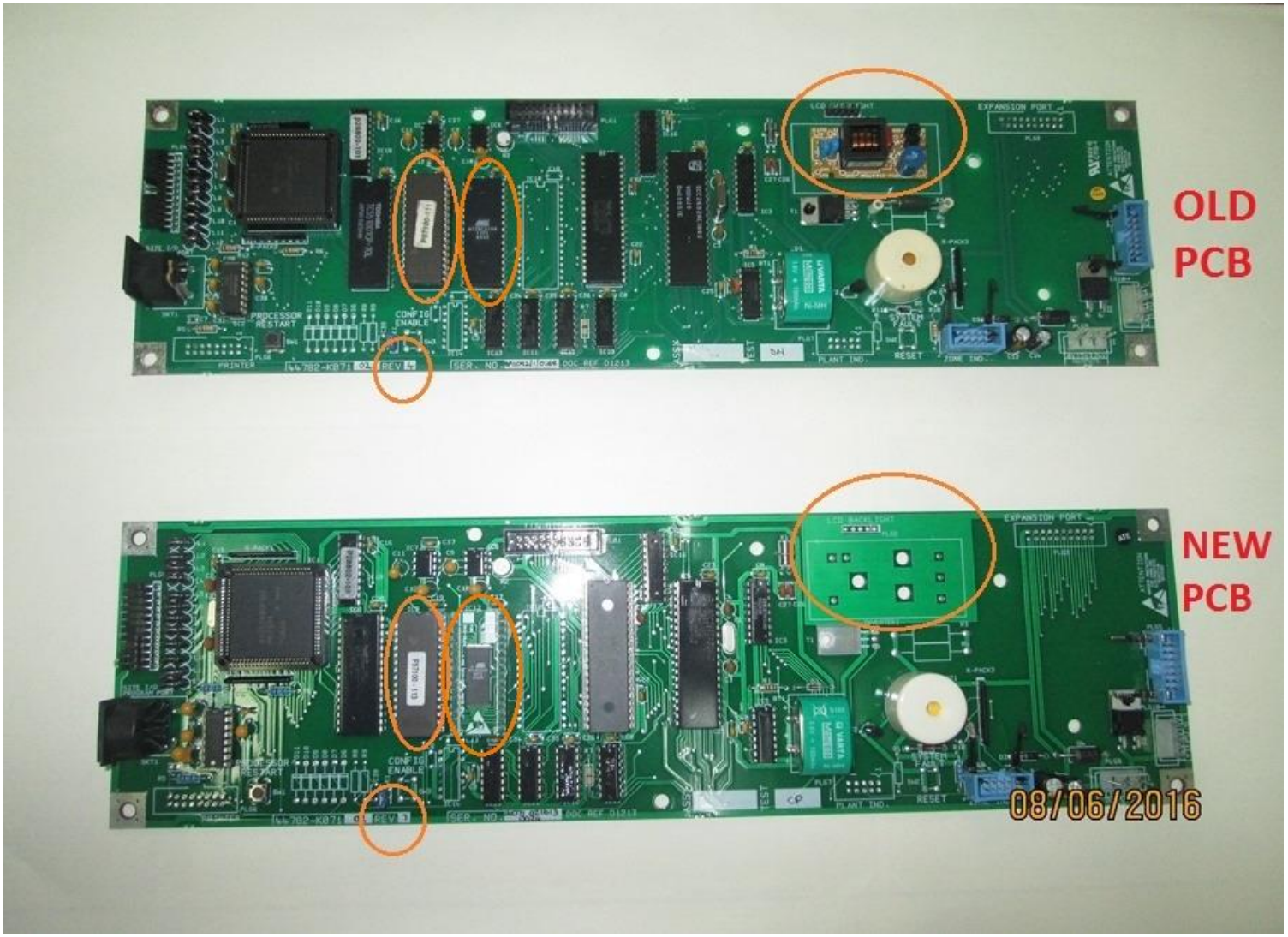
LCD Contrast



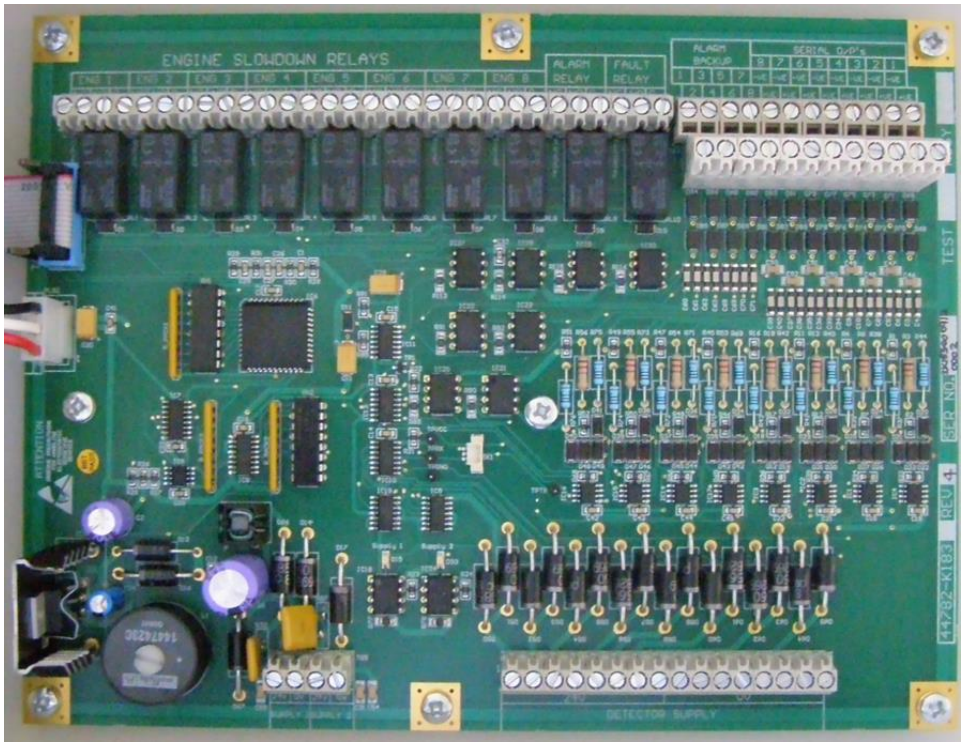
Event-Log Serial Link
Connector

EPROM
(System Software)

MAIN CONTROL PROCESSOR BOARD

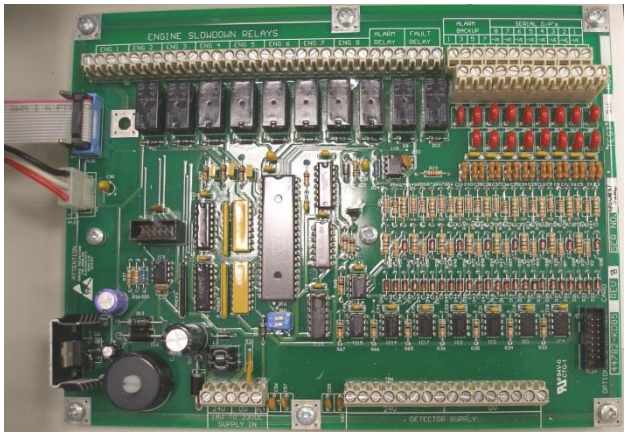


INTERFACE BOARD



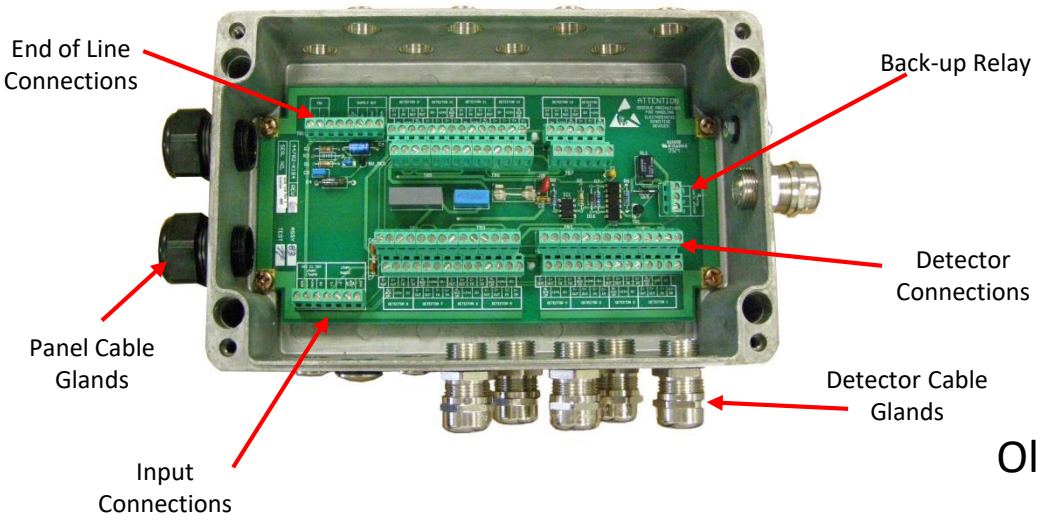
P/N 1-44782-K183
P/N 1-44782-K183X (non GL classed vessels)

Old Interface Board
P/N 1-44782-K085



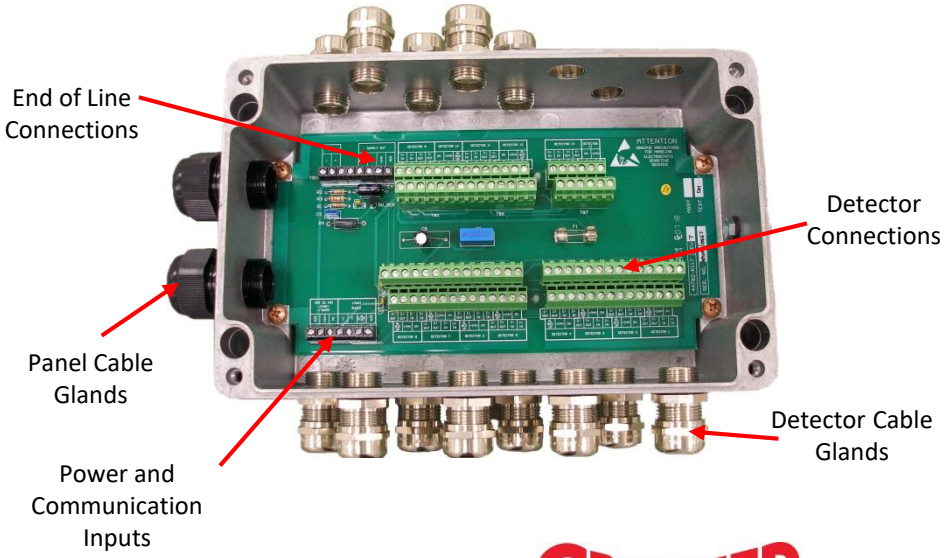
JUNCTION BOX

Junction Box Board (P/N 1-44782-K184)

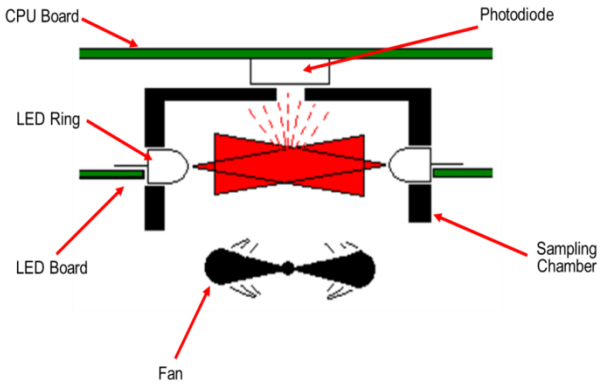


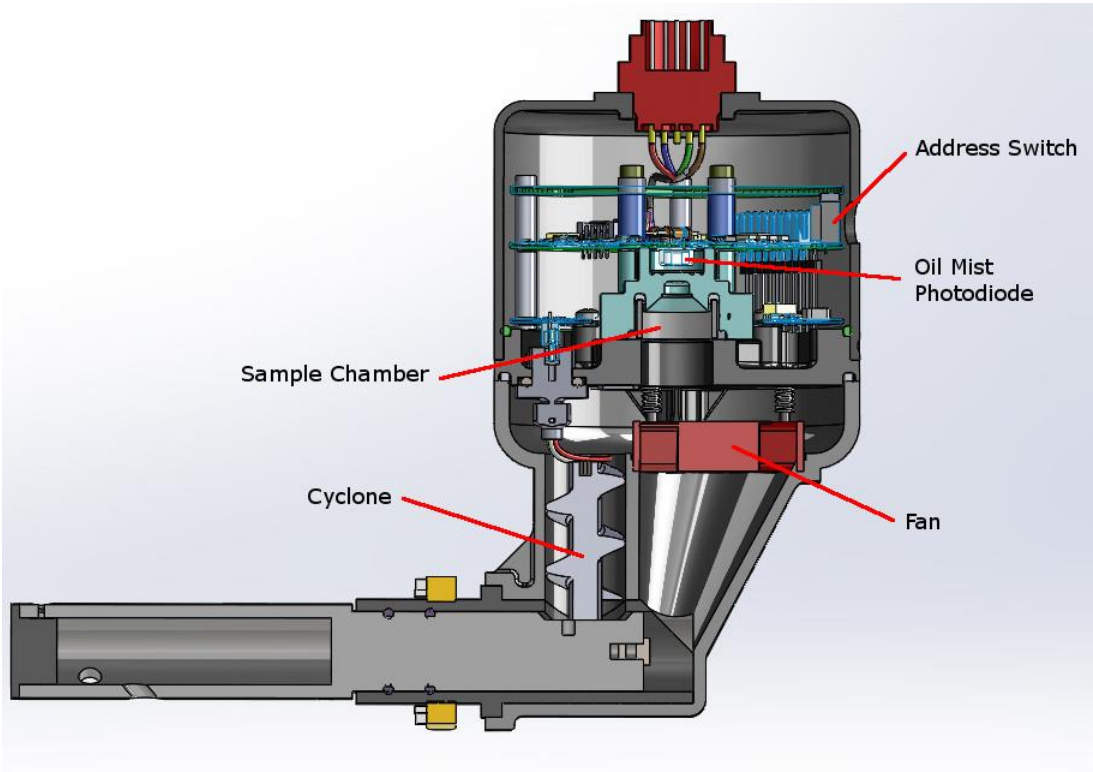
Board modified to GL spec.

Old Junction Box Board (P/N 1-44782-K117)



OMD MK6 DETECTOR





MK6 DETECTOR EVOLUTION

Green Detector.

Part Numbers affected: 1-E3561-301
1-E3561-301-01
1-D5622-001

From year 2015 following obsolescence of LED by supplier, opportunity taken to upgrade using the same technology as used in the Mk7 detector.
Upgrading resulted in reduction of PCB's from 3 down to 2.
and 8 LEDs down to 3 LEDs.
More reliable easier to clean.
The method employed to monitor the oil contamination in the sample chamber has been changed providing a more accurate measure of light reduction and minimising indication of contamination faults.
The revised detectors are fully interchangeable with any previous versions of Mk6 OMD detectors and can be identified by having a Green label around the detector as shown in the picture above.

MK6 DETECTOR EVOLUTION

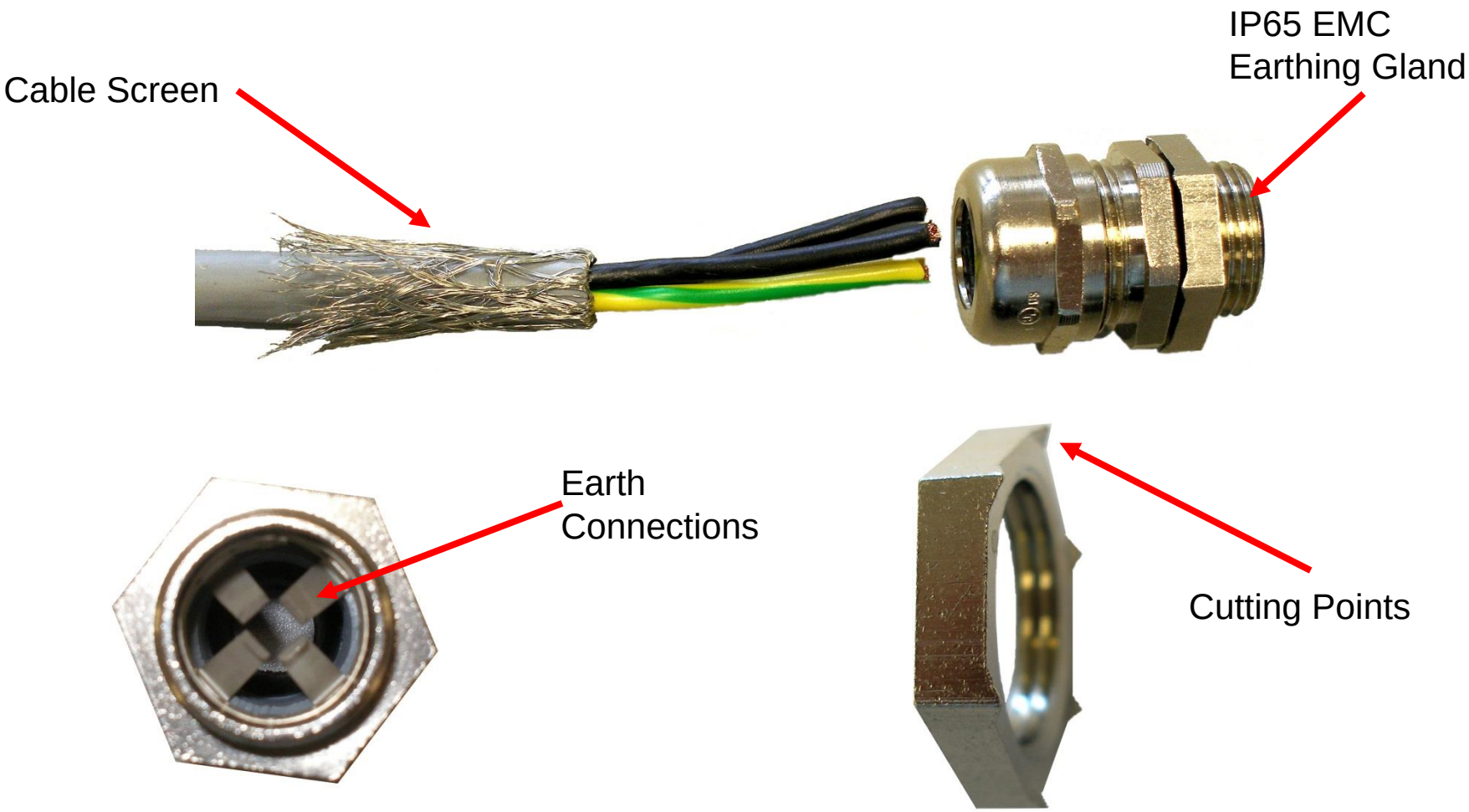
Part Numbers affected: 1-E3561-301
1-E3561-301-01
1-D5622-001

Blue Detector (white writing)
From year 2007 operating temperature of the power supply board capacitors upgraded from 85ºC to 105ºC to increase the life expectancy of the detector and increased ripple current on capacitors.

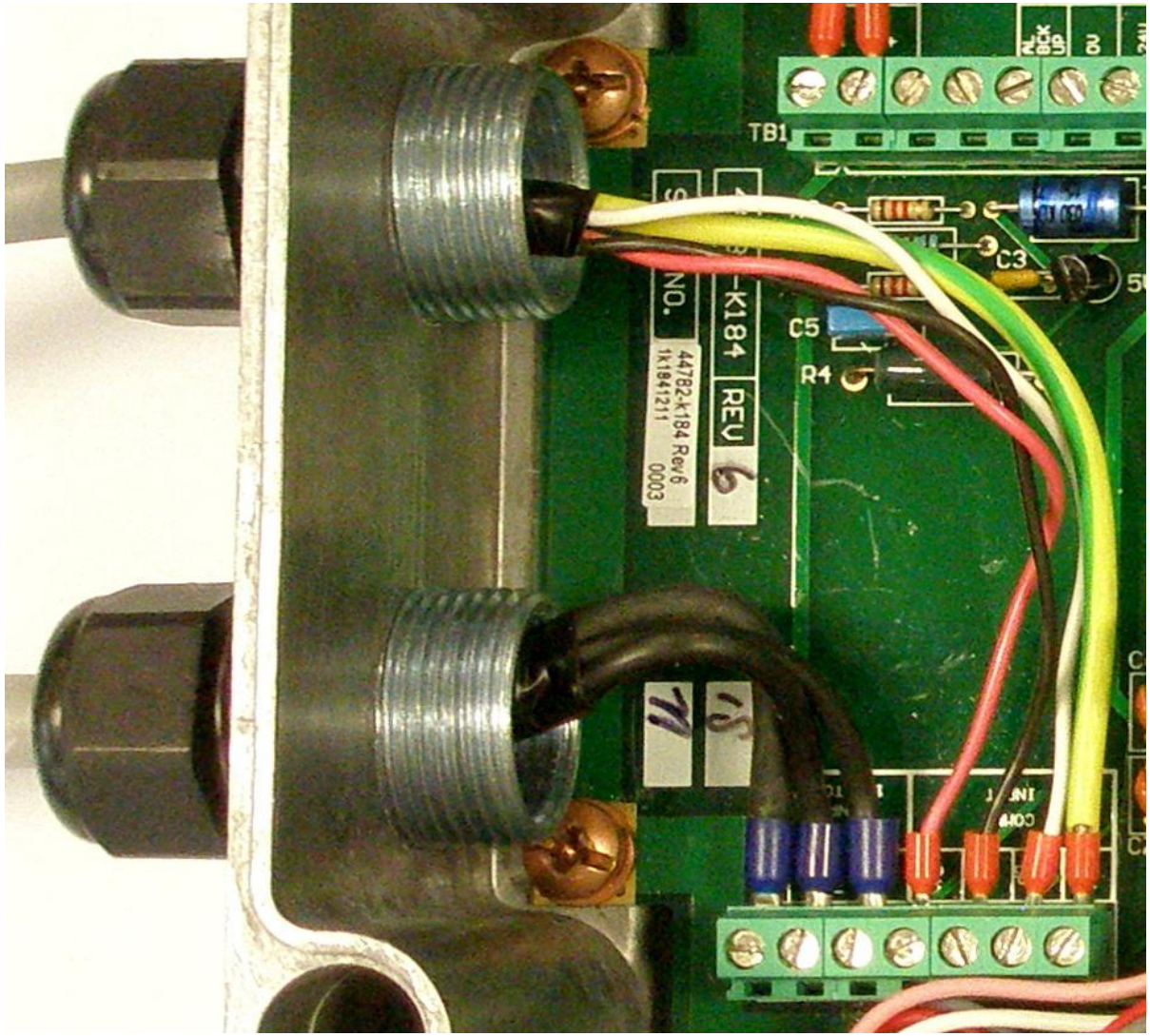
Blue Detector (black writing)
Modified in year 2001 to eliminate effects of high vibration
Potting compound used to eliminate movement due to vibration on the power supply board.
Resin & foam pads used to prevent the switch legs breaking due to vibration.
Four plastic struts positioned around the PCB's preventing any movement of the boards due to vibration.

Yellow Detector - was the first variant in year 2000.

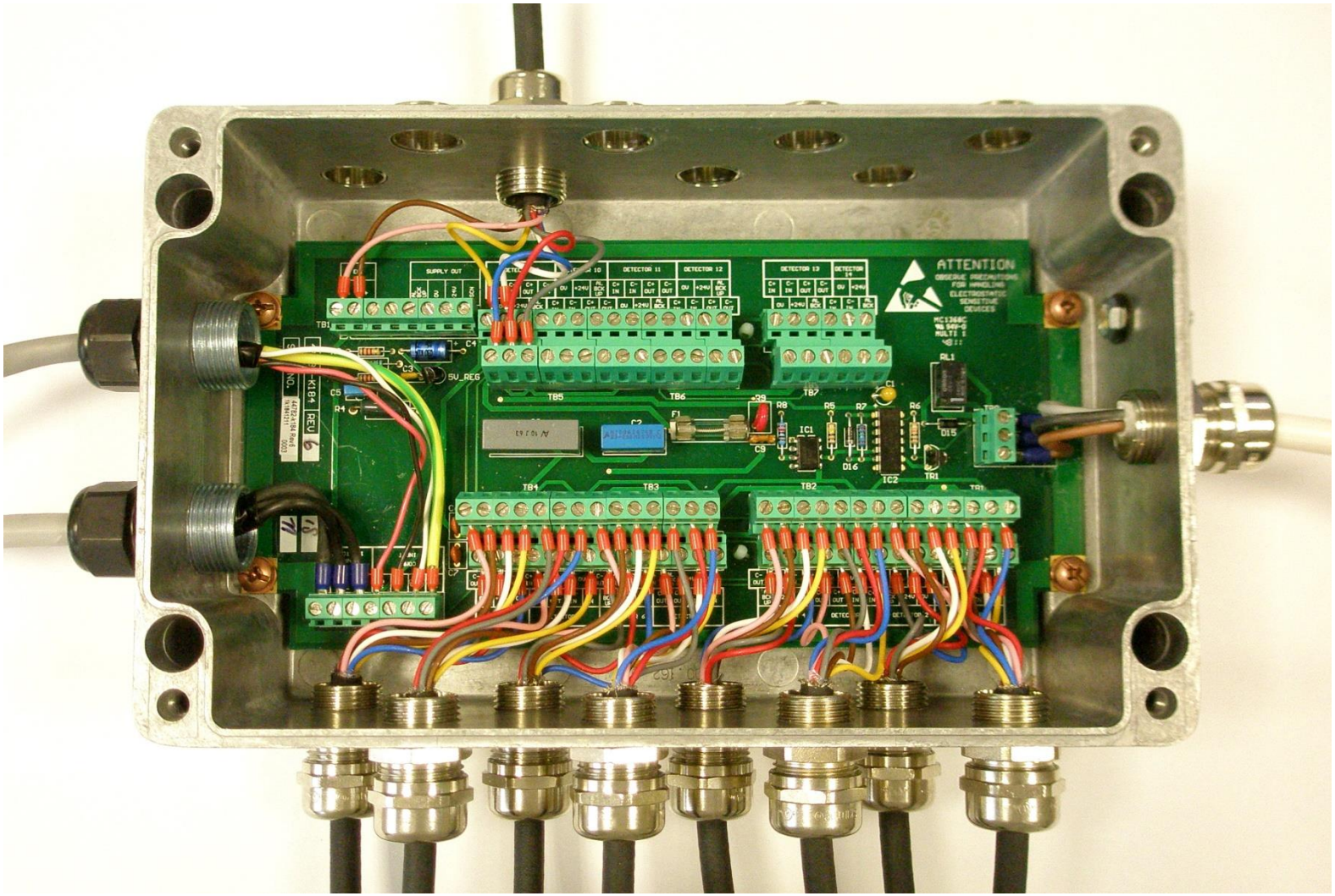
SYSTEM WIRING



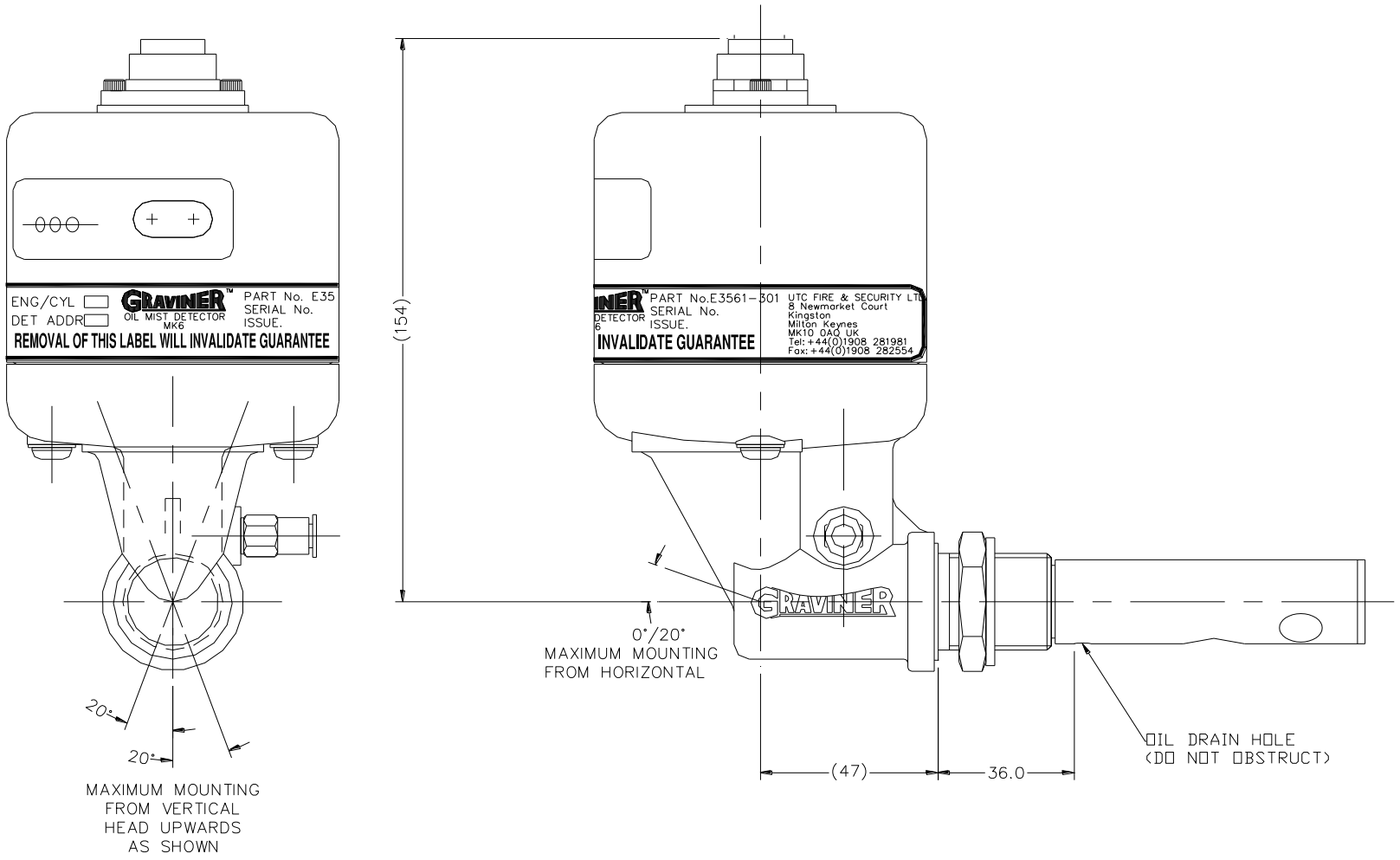
CONTROL PANEL TO JUNCTION BOX



JUNCTION BOX WIRING



DETECTOR


ENG/CYL
DET ADDR
GRAVINER
OIL MIST DETECTOR
MK6
PART No. E35
SERIAL No.
ISSUE.
REMOVAL OF THIS LABEL WILL INVALIDATE GUARANTEE
20°
20°
MAXIMUM MOUNTING
FROM VERTICAL
HEAD UPWARDS
AS SHOWN
(154)
PART No.E3561-301
SERIAL No.
ISSUE.
INVALIDATE GUARANTEE
UTC FIRE & SECURITY LTD
8 Newmarket Court
Kingston
Milton Keynes
MK10 0AQ UK
Tel: +44(0)1908 281981
Fax: +44(0)1908 282554
GRAVINER
0°/20°
MAXIMUM MOUNTING
FROM HORIZONTAL
OIL DRAIN HOLE
(DO NOT OBSTRUCT)
(47)
36.0

GRAVINER OMD MK6 SYSTEM

Fault Finding and Diagnostics

SYSTEM TESTING – Test Menu

System tests are available via the Test menu – press the Test key on the Control Panel.

1. Alarm Relay – Activates the common alarm relay until the test is cancelled
2. Fault Relay – Activates the fault relay until the test is cancelled
3. System Test – not used
4. LED/LCD Test – Tests the panel display LED's, the LCD and the buzzer. The software version is also shown on the display
5. Backup Alarm – Instructs each detector in turn to activate the backup alarm line. The panel buzzer is briefly activated by each of the backup activations.
6. Optics – Instructs each detector to perform a LED average and photodetector test. The result is read back when the panel requests the detector status.
7. Detector Alarm – The specified detector activates an alarm condition

SYSTEM TESTING – Smoke Test

The smoke test will cause the panel to indicate an alarm condition and activate the relays.

Attach the smoke tester in to the valve on the side of the detector.

Introduce smoke in to the smoke tester using either the wick and bulb or using artificial smoke to produce an alarm.

Recommended smoke: SmokeCheck 25S

REPLACE EEPROM

The EEPROM contains the event-log, the system configuration and the peak oil mist levels.

The EEPROM manufacturer guarantees a maximum of 10,000 writes.

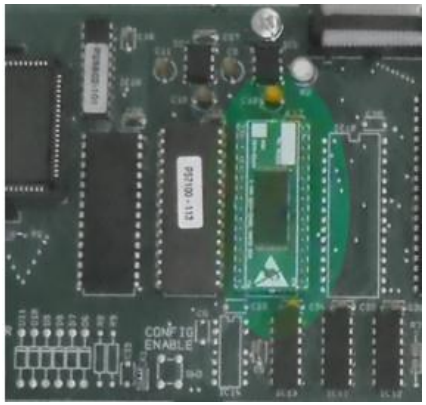
The Control Panel counts the number of writes made to the EEPROM, when the count reaches 10,000 the panel will indicate the EEPROM should be replaced.

The LCD will display ‘Replace EEPROM’

The Oil Mist Detection ability is NOT affected by this warning.

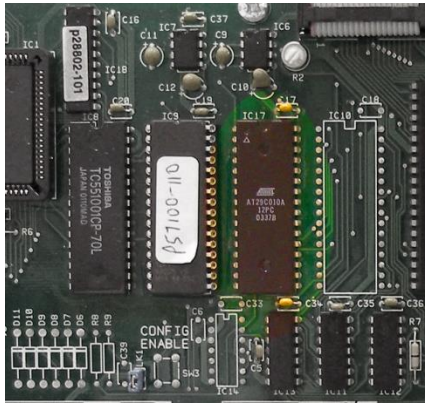
However it means changes in the event-log, the system configuration and the peak oil mist levels may not be stored.

REPLACE EEPROM



The EEPROM can be replaced without removing the Main Control Processor Board.

Part No. 1-44782-K182



If the EEPROM is soldered in place, then the complete Main Control Processor Board must be changed.

Part No. 1-44782-K071-02

REPLACE EEPROM

Before removing the EEPROM make a note of the system configuration.

Number of engines

- Can be seen on the main display screen

Number of detectors per engine

- Can be seen on the engine display screen

Average alarm setting for each engine

- Default value 0.7mg/l
- Engineer > 1. Configure System > 3. Alarm Levels > 1. Set Average Alarm > (Lists engine average alarm settings)

Deviation alarm for each engine

- Default value 0.3mg/l
- Engineer > 1. Configure System > 3. Alarm Levels > 2. Set Deviation Alarm > (Select engine) > (Lists detector deviation alarms for selected engine)

REPLACE EEPROM - Removable EEPROM

Switch off the power to the system.

Remove the EEPROM from the socket, IC17 on the Main Control Processor Board.

Plug the new EEPROM in to the socket, ensure it is the right way up and that all of the pins are correctly in the socket.

Switch on the power to the system.

Program the panel configuration and alarm levels.

REPLACE EEPROM - Soldered EEPROM

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

Switch off the power to the system.

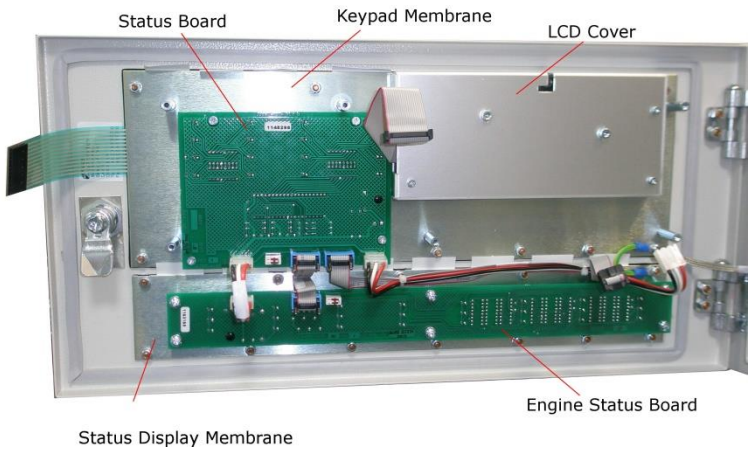
Unplug the cables from the Main Control Processor Board.

Remove the PCB fixing screws, 8 screws in total.

Remove the Main Control Processor Board and replace it with the new board.

The LCD must also be replaced if an old version is fitted.

REPLACE EEPROM - Soldered EEPROM



Remove the LCD Cover, 4 fixing screws

Remove the LCD, 4 metal pillars

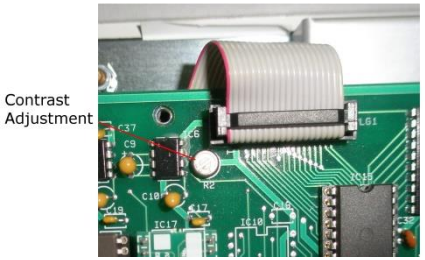
REPLACE EEPROM - Soldered EEPROM

Reverse the procedure to fit the replacement LCD, LCD cover and the replacement Main Processor Board.

Switch on the power to the system.

If the LCD looks blank

Adjust the contrast on the Main Processor Board to produce a readable display.



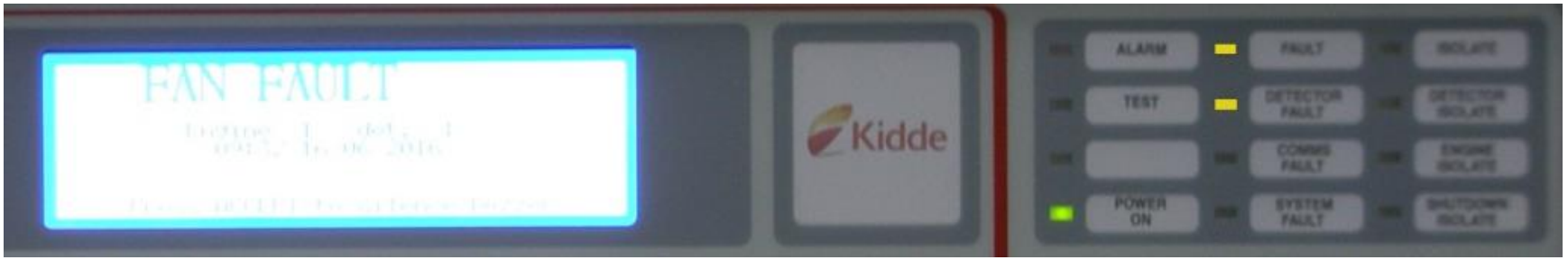
Program the panel configuration and alarm levels.

DETECTOR FAN FAULT

The detector continuously monitors the fan for correct operation.

If the fan stops a fault is indicated to the Control Panel.

The engine and detector are displayed on the LCD and the detector fault LED will be on.



DETECTOR FAN FAULT

Single screw fan, 1-D5622-005-02

Isolate the detector at the Control Panel

Disconnect the detector cable.

Remove the detector from the base.

Wipe off any excess oil on the base.

Remove the fan socket fixing screw and pull out the socket.

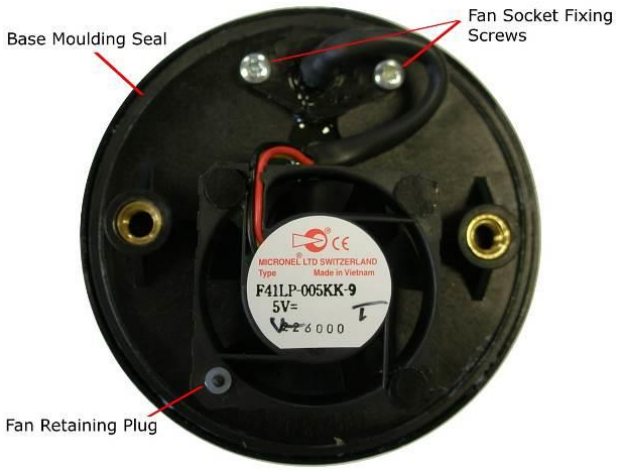
Remove the foam seal and any of the adhesive tape from inside the base.

Remove the fan retaining plug, being careful not to lose the plug or the compression springs when removing the fan.

Reverse the process to fit the replacement fan, removing the paper covering the adhesive tape at the ends of the foam seal.

DETECTOR FAN FAULT

Double screw fan, 1-53569-K005



Isolate the detector at the Control Panel

Disconnect the detector cable.

Remove the detector from the base.

Wipe off any excess oil on the base.

Remove the fan socket fixing screws and pull out the socket.

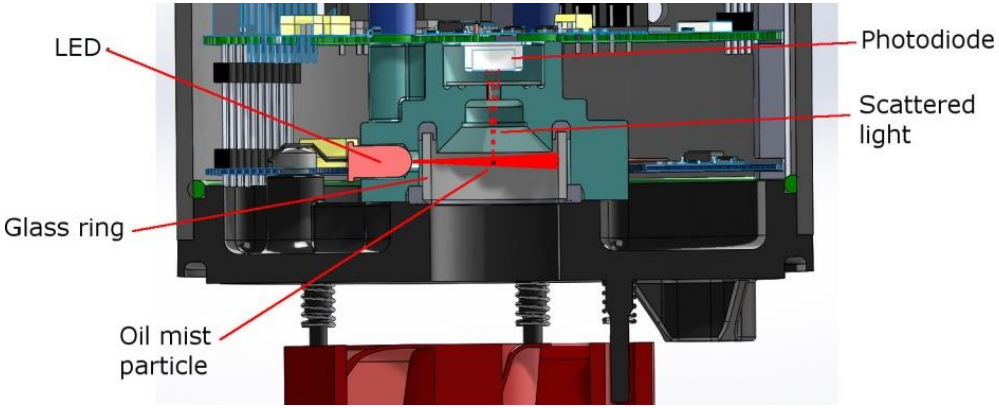
Remove the silicone O ring from inside the base.

Remove the fan retaining plug, being careful not to lose the plug or the compression springs when removing the fan.

Reverse the process to fit the replacement fan.

LED FAULT

LED’s are used to illuminate the sample chamber.



A glass ring protects the LED’s from the oil in the sample chamber.

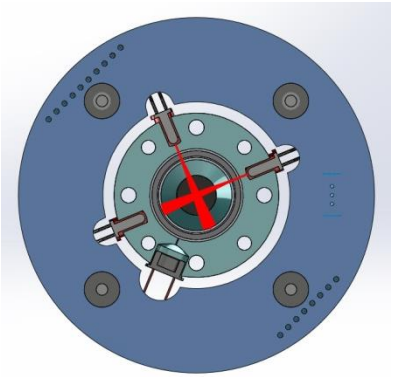
Oil mist passing through sample chamber causes the light from the LED’s to be scattered.

Some of the scattered light is measured by a photodiode.

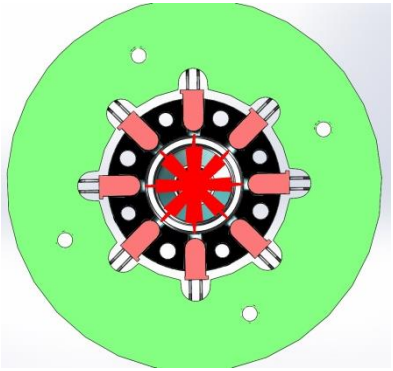
The amount of scattered light indicates the amount of oil mist present.

LED FAULT

An LED fault may occur at the automatic16:00 system test or when a manual optics test is performed, via the test menu.



Green label detectors the LED light level is measured by a photodiode.



Yellow and blue label detectors the light level is measured by the opposite LED.

LED FAULT

The LED fault indicates that the light inside the detector sample chamber has been reduced affecting the accuracy of the detector.

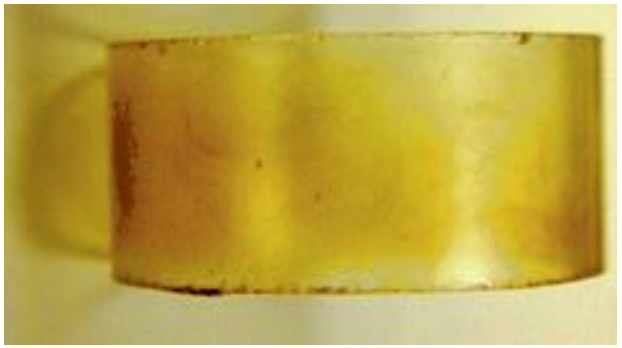
The main cause of an LED fault is oil build up on the glass wall of the chamber which reduces the amount of light entering the sample area.

Cleaning the detector will restore the detector back to normal operation.

In some cases deposits from the oil mist may be hardened on to the glass due to the heat of the engine.

These cannot be removed by normal cleaning.

In this case the detector must be replaced.



LED FAULT - Cleaning the detector

The required cleaning equipment is provided in the Service Kit, 1-D9221-027

Isolate the detector at the Control Panel

Disconnect the detector cable.

Remove the detector from the base. Wipe off any excess oil on the base.

Remove the fan retaining plug, being careful not to loose the plug or the compression springs when removing the fan.

Spray a little of the glass cleaning solution on to a foam bud.

LED FAULT - Cleaning the detector

Wipe the inside of the sample chamber with the foam bud, including the photodiode aperture at the end.

Using a clean dry foam bud wipe the inside of the sample chamber to remove any excess glass cleaning fluid.

Replace the fan, fix the detector onto the detector base and reconnect the detector cable.

At the Control Panel de-isolate the detector and perform an optics test via the test menu.

- Test > 6. Optics

LED FAULT - Cleaning the detector

If the optics test fails repeat the process a second time.

If the optics test fails after a second cleaning the detector head should be replaced.

The frequency at which a detector requires cleaning will depend on the amount of oil mist produced in the engine, the running temperature, the oil used…

DETECTOR COMMUNICATIONS

The communication with a detector is via an RS485 serial data link.

Commands from the Control Panel are sent to each detector address one at a time.

The detector with the correct address replies to the command.

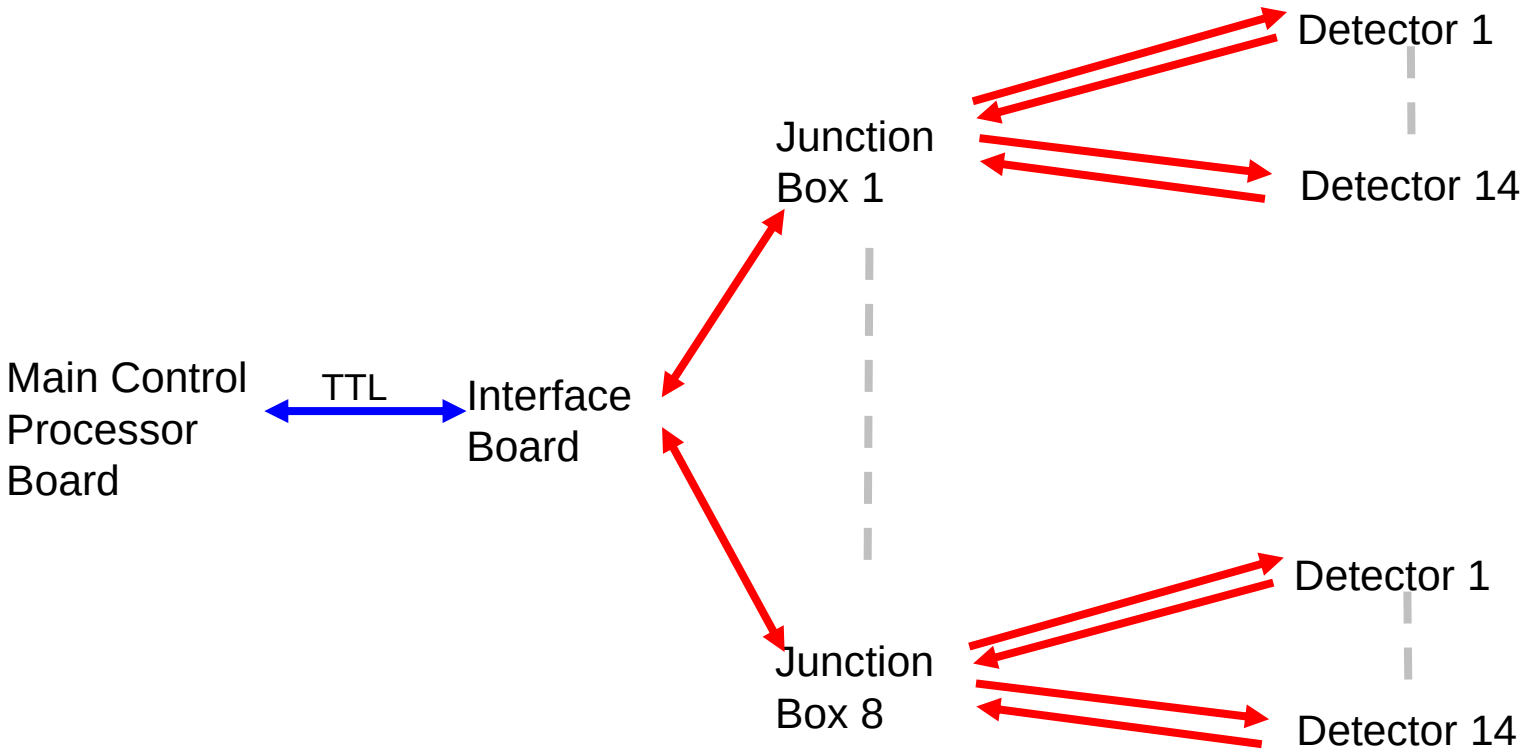
The Control Panel then moves on to the next detector address.

For a maximum size system of 64 detectors, all detectors will be addressed in 1.2 seconds.

Every message to and from the Control Panel has a set format and a checksum. If the message does not meet the correct format it is ignored.

If a number of consecutive messages do not meet the correct format a communications fault is indicated on the Control Panel.

DETECTOR COMMUNICATIONS



DETECTOR COMMUNICATIONS

Identifying the cause

Communications fault may be caused by:

Incorrectly / poorly screened cables.

Detector failure

Incorrectly wired detector

Detector cable failure

Junction Box failure

Control Panel to Junction Box connection failure

Interface Board failure

Main Processor Board failure

Electrical noise on the communication lines

DETECTOR COMMUNICATIONS

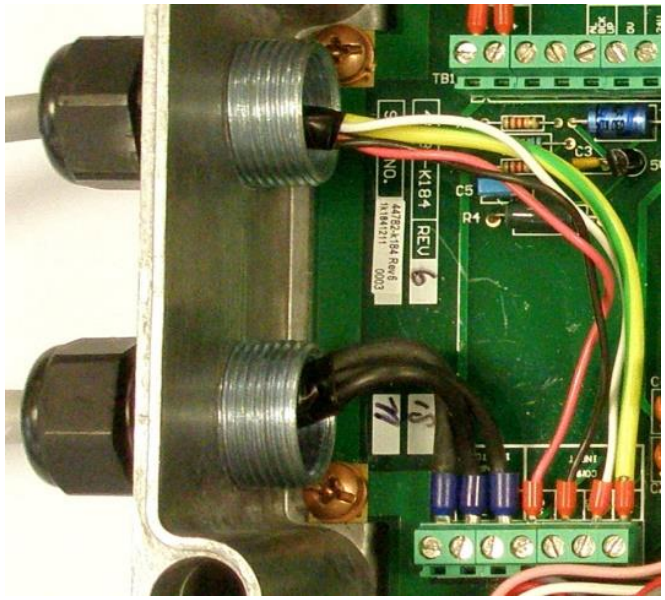
Identifying the cause – cable screening

Due to the long cable lengths between the Control Panel and the detectors the communications are susceptible to electrical interference if the cables are not screened correctly.

Control Panel – all cables must be screened and the screen connected to a metal gland.

DETECTOR COMMUNICATIONS

Identifying the cause – cable screening



Junction Box from the Control Panel – cables must be screened. The cables pass through the plastic glands into the Junction Box. The cable screens connect in to the SCN terminals for the supply and communications inputs.

The screens must not be connected directly to earth.

Junction Box to detector – the cable screens must be connected in the metal glands.

DETECTOR COMMUNICATIONS

Identifying the cause – Individual detector failure

Loss of communications with some of the detectors connected to a Junction Box.

Identify the detectors in fault, indicated on the panel LCD.

Isolate the detector then swap the detector with a neighbouring known working detector. Do not change the addresses.

De-isolate the detector.

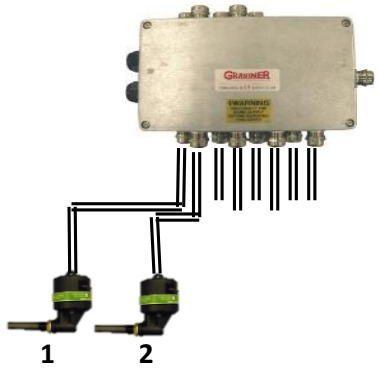
Does the panel indicate the communication fault on the same detector?

Yes – the fault is in the detector – replace the detector.

No – the fault is with the detector cabling.

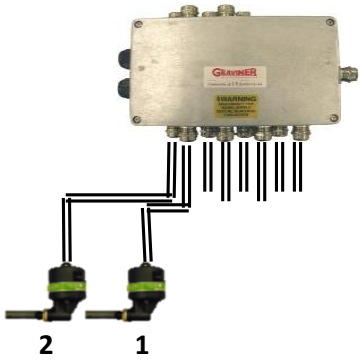
DETECTOR COMMUNICATIONS

Identifying the cause – Individual detector failure



Panel indicates Comms Fault

Engine 1 detector 2



Swap with a neighbouring detector.

Panel indicates Comms Fault - Engine 1 detector 2

- Detector is faulty – Replace the detector

Panel indicates Comms Fault - Engine 1 detector 1

- Check the detector cable

DETECTOR COMMUNICATIONS

Identifying the cause – Individual detector failure

ATTENTION
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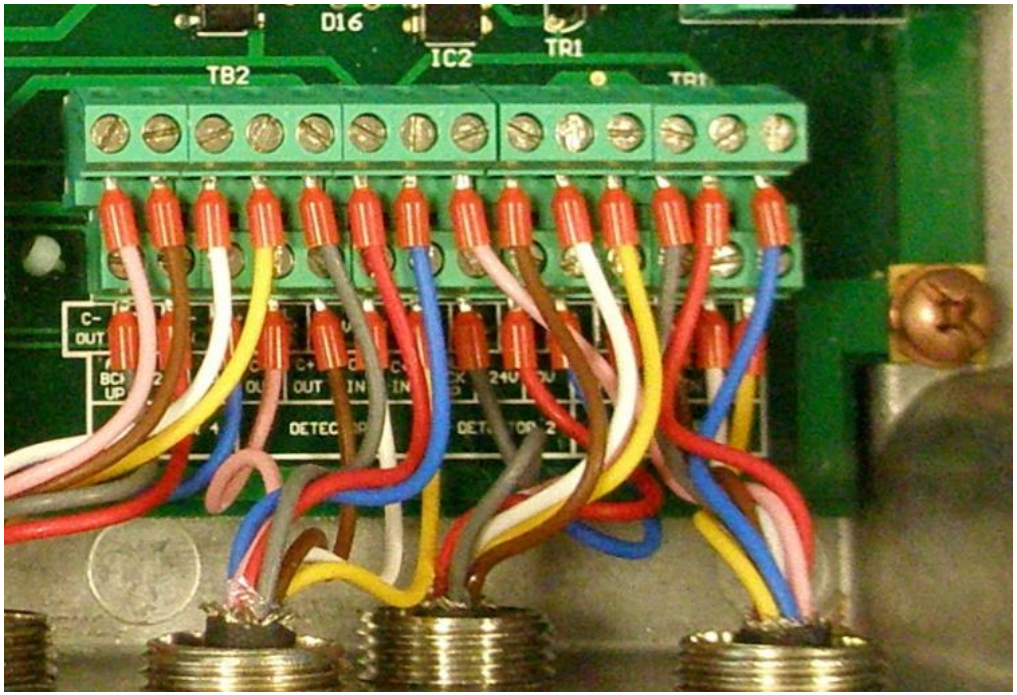
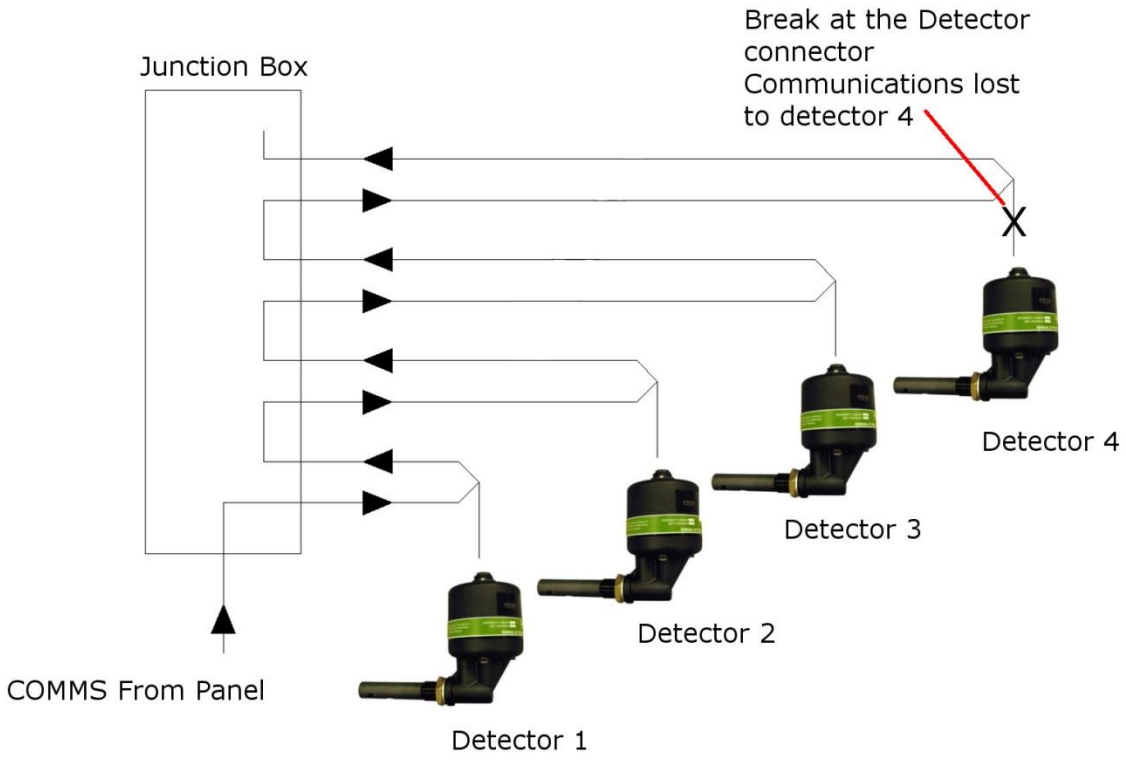
Visually check that each of the wires are securely in the correct terminals. (Incorrect wiring of the detector cables may result in damage to the detectors.)



DETECTOR COMMUNICATIONS

Identifying the cause – Individual detector failure

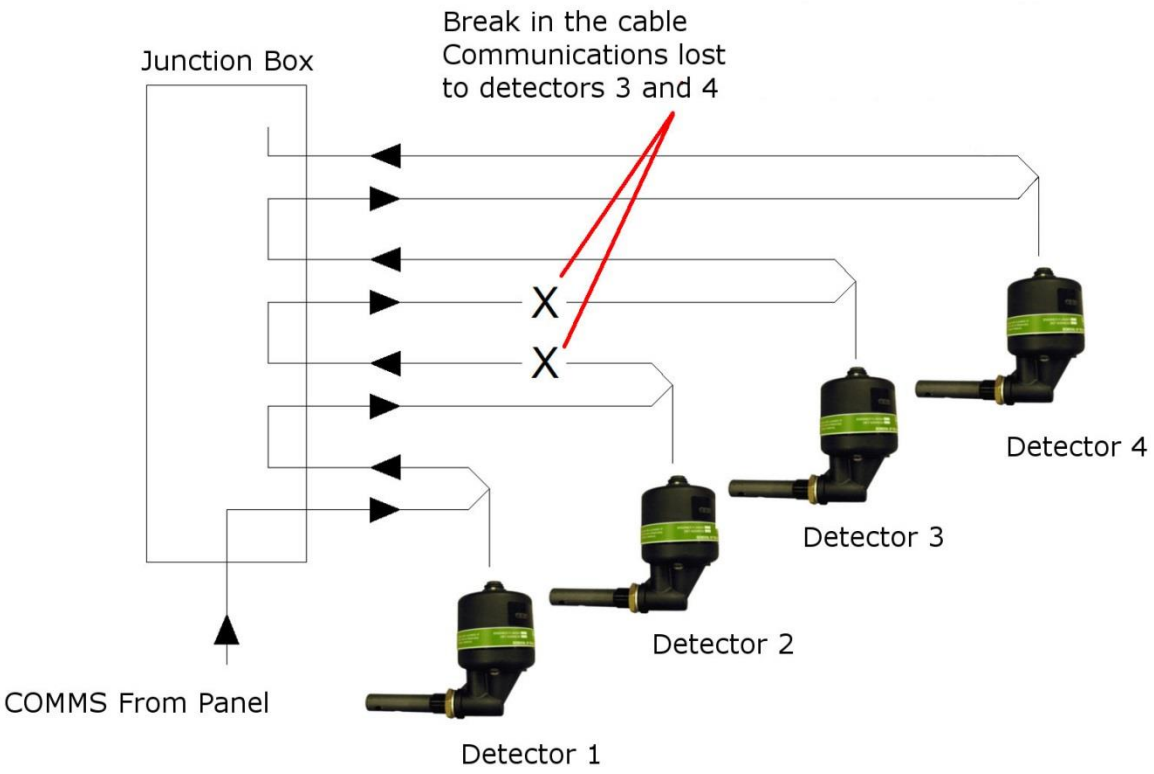
Break at the detector head will cause a communication fault with one detector.



DETECTOR COMMUNICATIONS

Identifying the cause – Sequential detector failure

Communication is lost to all detectors connected on a Junction Box from a specific detector onwards.



DETECTOR COMMUNICATIONS

Identifying the cause – Sequential detector failure

Break in the cable will cause a loss of communications with all detectors connected after the break.

Remove the power from the system

Using a multi-meter measure the continuity between the c+ in (yellow), c+ out (brown) and between c- in (white), c- out (pink) terminals in the Junction Box for the detectors before and after the first detector with communications fault.

A short circuit should be measured in both cases.

If a short circuit is not measured replace the detector cable.

DETECTOR COMMUNICATIONS

Identifying the cause – Contiguous detector failure

After checking the detector cables for continuity measure the continuity between the c+ in (yellow) terminals and between c- in (white) terminals in the Junction Box for the detectors before and after the first detector with communications fault.

A short circuit should be measured in both cases.

If a short circuit is not measured replace the Junction Box PCB.

DETECTOR COMMUNICATIONS

Identifying the cause – All detectors on a Junction Box

The panel is indicating communications faults with all of the detectors connected to a Junction Box.

Check that the green power LED is on for the detectors.

If no green LED's are on:

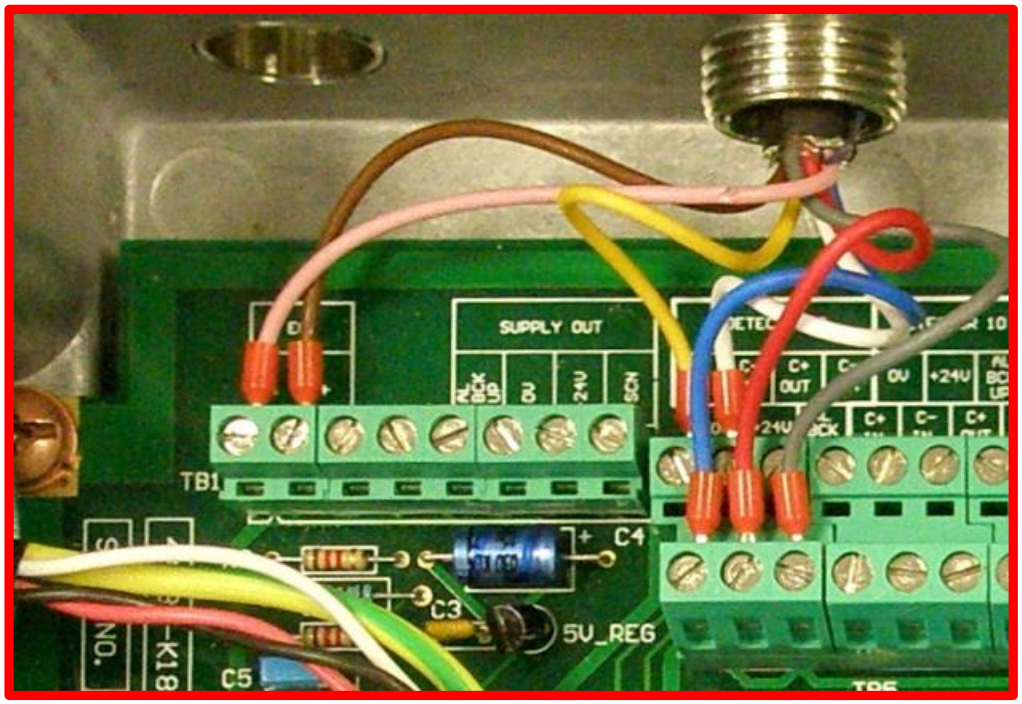
- Check fuse F1 on the Junction Box board, replace if necessary.
- Using a multi-meter check the voltage between Supply Input +24v and 0v terminals on the Junction Box board. The voltage measure should be between 18 and 33v.
- Check the Junction Box power connections in the panel.

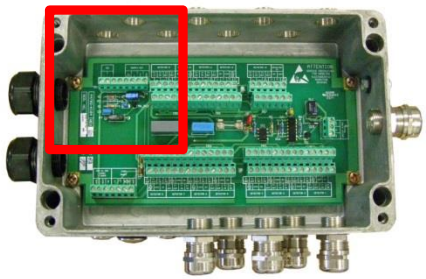
DETECTOR COMMUNICATIONS

Identifying the cause – All detectors on a Junction Box

If the green LED's are on:

Check that the C+ out and C- out wires of the last detector are connected to the EOL terminals in the Junction Box. EOL + (brown) EOL – (pink).





DETECTOR COMMUNICATIONS

Identifying the cause – All detectors on a Junction Box

Isolate the engine and disconnect the Serial O/P +ve and -ve wires for the engine at the Control Panel.

Using a multi-meter measure the D.C. voltage between:

- the free Serial O/P +ve and -ve wires at the Control Panel,
- the Comms Input C+ and C- terminals in the Junction Box
- the EOL + and – terminals in the Junction Box
- In each case the voltage should be between 200 and 300mV.

DETECTOR COMMUNICATIONS

Identifying the cause – All detectors on a Junction Box

Measurement point	Correct voltage measured			
Serial O/P +ve and -ve wires in the Control Panel	Y	N	N	N
Comms Input C+ and C- terminals in the Junction Box	Y	Y	N	N
EOL + and – terminals in the Junction Box	Y	Y	Y	N
Action	Communication path is connected correctly.	Replace the Control Panel to Junction Box communications cable	Check the continuity of the C+ and C- connections in the Junction Box to identify damaged detector cable or damaged Junction Box PCB, replace as necessary.	Replace the Junction Box PCB.

DETECTOR COMMUNICATIONS

Identifying the cause – All detectors on a Junction Box

If the EOL voltage measured is the wrong polarity check for crossed C+ and C- wires in the Junction Box.

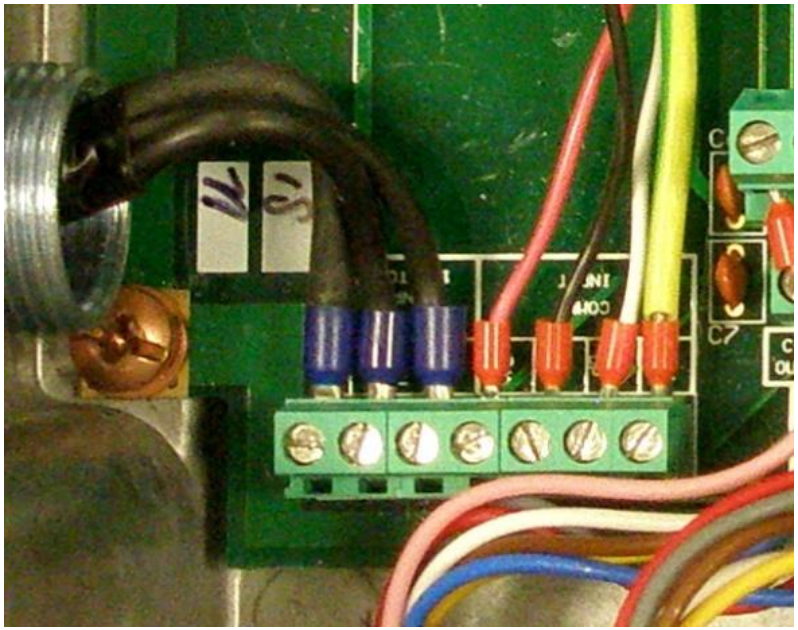
If the correct EOL voltage is measured between the Serial O/P +ve and -ve wires at the Control Panel:

- Switch off the power to the system
- Using a multi-meter measure the resistance between C+ and C- wires and the Control Panel earth stud. If the resistance is <10MΩ replace the Junction Box PCB.
- Disconnect the panel to Junction Box cable screens from the SCN terminals

DETECTOR COMMUNICATIONS

Identifying the cause – All detectors on a Junction Box

- Disconnect the Control Panel to Junction Box cable screens from the SCN terminals.



- Using a multi-meter measure the resistance between the SCN terminals and the Junction Box earth stud. If the resistance is <10MΩ replace the Junction Box PCB.

DETECTOR COMMUNICATIONS

Identifying the cause – All detectors on a Junction Box

If no faults were found during the previous investigations replace the Interface Board in the Control Panel.

In some situations a temporary fix may be to move the communications connections to a spare Serial O/P until a replacement Interface Board can be obtained.

DETECTOR COMMUNICATIONS

Identifying the cause – All detectors

In the event of a loss of communications with all detector it is not possible to identify the failure without specialized equipment.

The failure may be either the Control Panel Interface Board or the Main Processor Board.

Replace the Interface Board first.

If this does not eliminate the fault replace the Main Processor Board.

DETECTOR COMMUNICATIONS

Identifying the cause – Random detectors

Communication faults are indicated on varying detectors with no fixed pattern.

Common cause is electrical interference on the Communications wires.

Isolate all engines, disconnect the detector cables from all detectors and disconnect all Serial O/P's at the Control Panel except Serial O/P 1.

Reconnect detector 1 and de-isolate the detector. Allow a short period of time to determine if a communications error will occur.

DETECTOR COMMUNICATIONS

Identifying the cause – Random detectors

If a communication fault occurs replace detector 1 with a spare detector.

If a communication fault re-occurs call a service engineer to investigate further.

If the detector communicates correctly add the remaining detectors one at a time, de-isolating each detector added and allowing a short period to determine if a communications error will occur.

In the event of a communications error occurring replace the last detector added.

Reconnect the Serial O/P for the next engine.

Continue the process until all detectors have been reconnected.

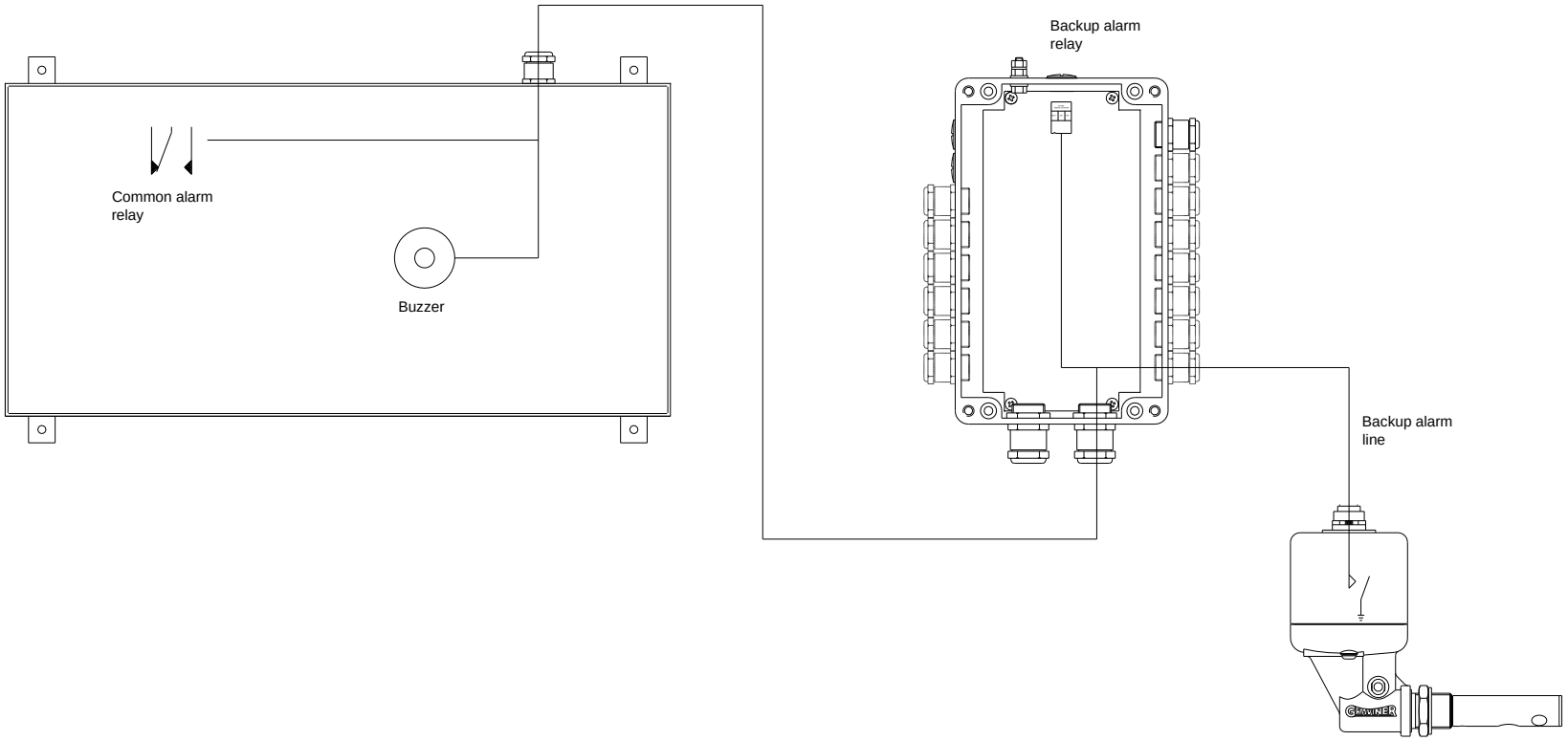
BACKUP ALARM FAILURES

The backup alarm is a safety feature providing a fixed alarm level (1.6mg/l) independent of the system software.

The backup alarm automatically sounds the buzzer, activates the common alarm relay in the Control Panel, activates the backup alarm relay in the Junction Box and turns on the detector alarm LED.

As the alarm is software independent it can not be reset as long as it is active, i.e. as long as the oil mist level is above 1.6mg/l.

BACKUP ALARM FAILURES



The backup alarm line is connected to 0v at the detector when the oil mist level is above 1.6mg/l.

The backup alarm connection is common to all detectors.

BACKUP ALARM FAILURES

At 16:00 or via the Backup Alarm Test the panel issues a command to each detector one at a time to activate the backup alarm, connecting the backup alarm line to 0v.

The activation of the backup alarm is monitored by the Control Panel checking the continuity of the backup alarm connection from the detector to the Control Panel.

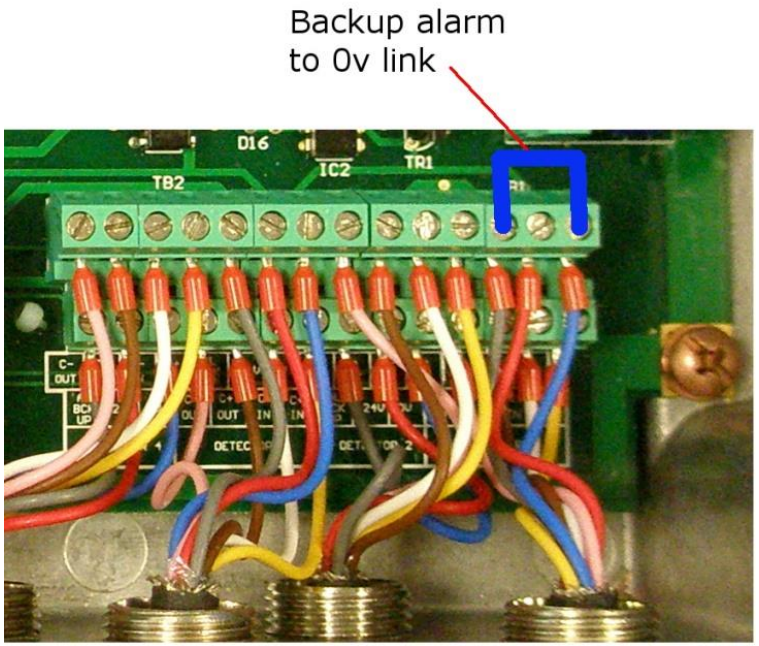
If the activation of the backup alarm signal is not detected a Backup Alarm Fault is indicated by the Control Panel indicating the failed detector.

BACKUP ALARM FAILURES

Backup alarm fault – Individual detector

During the diagnosis of a backup alarm fault the Common Alarm Relay will be activated, this should be disconnected from the ships system before proceeding.

For the detector in fault link the backup alarm terminal to 0v in the Junction Box



BACKUP ALARM FAILURES

Backup alarm fault – Individual detector

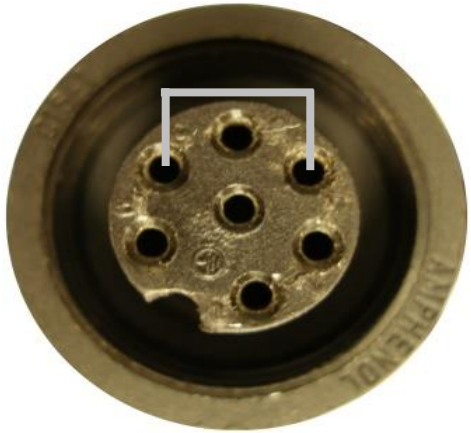
A backup alarm should be indicated at the panel sounding the buzzer.

If the buzzer is not operated replace the Junction Box Board.

If the buzzer operates:

Isolate the detector at the panel

Disconnect the plug from the detector, connect pin 3 to pin 5.



BACKUP ALARM FAILURES

Backup alarm fault – Individual detector

A backup alarm should be indicated at the panel sounding the buzzer.

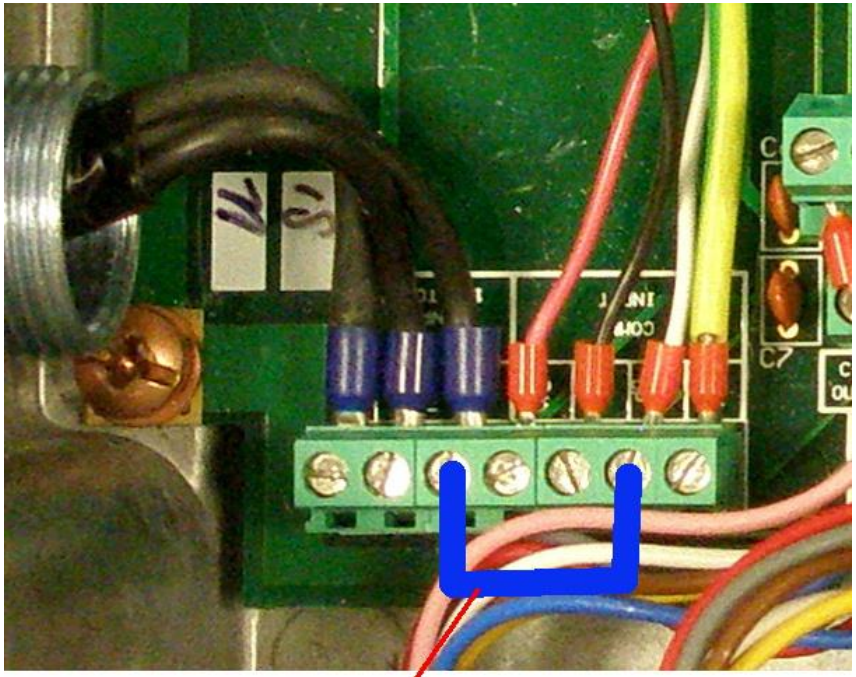
If the buzzer is not operated replace the detector cable.

If the buzzer operates replace the detector.

BACKUP ALARM FAILURES

Backup alarm fault – All detectors on a Junction Box

In the Junction Box link the Comms Input Backup Alarm Terminal to 0v.



Backup alarm
to 0v link

BACKUP ALARM FAILURES

Backup alarm fault – All detectors on a Junction Box

A backup alarm should be indicated at the panel sounding the buzzer.

If the buzzer operates replace the Junction Box Board.

If the buzzer is not operated connect the backup alarm terminal in the Control Panel to 0v.

If the buzzer operates replace the communications cable between the Control Panel and Junction Box.

If the buzzer does not operate replace the Control Panel Interface Board.

BACKUP ALARM FAILURES

Backup alarm fault – All detectors

Replace the Control Panel Interface Board.

BACKUP ALARM FAILURES

Backup alarm can not be reset.

The buzzer is constantly sounding and can not be reset.

Disconnect all of the backup alarm connections on the Interface Board in the Control Panel.

Press Accept and Reset on the Control Panel.

If the buzzer is sounding replace the Control Panel Interface Board.

If the buzzer is off reconnect the backup alarm wires one at a time.

The buzzer will sound when the failed engine connection is made.

BACKUP ALARM FAILURES

Backup alarm can not be reset.

Disconnect the Comms Input Backup alarm wire in the Junction Box of the failed engine.

Press Accept and Reset the Control Panel.

If the buzzer is sounding replace the communications cable between the Control Panel and the Junction Box.

If the buzzer is off reconnect the backup alarm wires.

The buzzer will resound.

Isolate the detectors on the engine and disconnect the detector cables.

Acknowledge and Reset the panel.

BACKUP ALARM FAILURES

Backup alarm can not be reset.

If the buzzer is off reconnect the detectors one at a time.

The buzzer will sound when the failed detector is connected.

Replace the detector.

If the buzzer is on disconnect the backup alarm wire in the Junction Box for each detector.

Press Accept & Reset on the Control Panel.

Reconnect the backup alarm wires one at a time.

The buzzer will sound when the failed detector cable is reconnected.

Replace the detector cable.

ACCESSORY KITS

Commissioning Kit (P/N D9221-026)

Description	Individual Part No	Quantity
Wipes, Wet & Dry	1-A7311-001	2
Smoke Test Oil 30ml	1-D9221-028	1
Wick – 150mm	1-17100-H06	3
(when bought separately comes as 1 Hank = 10 mtrs)		
Smoke Tester	1-D9221-029	1

ACCESSORY KITS

Service Kit (P/N D9221-027)

Description	Individual Part No	Quantity
Fan Retainer	1-B3741-902	5
Compression Spring	1-B3721-006	5
Base Moulding Seal	1-C1513-802	5
Fan Connector Seal	1-C1413-801	5
M3 Screw	1-21833-H01	5
Glass Cleaner 250ml	1-A7311-002	1
Foam Bud Packets (25 buds)	1-B6910-217	2
4mm Hexagon Key	1-B6910-219	2
Pulling Tool	1-D9131-002	1

ACCESSORY KITS

Smoke Tester Kit (P/N D9221-029)

Description	Individual Part No	Quantity
Body	1-C1731-401	1
Wick Holder	1-C2625-401	1
Pipette Bulb	1-B2711-001	1
Nylon Pipe Blue (130mm)	1-18272-024	1

Note: we have also approved the use of smoke canisters (SmokeCheck-Type 25S).

ACCESSORY KITS

Spares Kit (P/N D9221-025)

Description	Individual Part No	Quantity
Cable Assembly 25mtr 90degree	1-43682-K109-08	1
Mk6 Replacement Detector Head Assy	1-D5622-001	1
Main Processor PCB Assy	1-44782-K071-02	1
Switch Window	1-C9189-801	1
Interface Board PCB Assy	1-44782-K183	1