Action code: AT FIRST OPPORTUNITY

ECS Noise Detection Alarms due to Periodic 24-VDC Low Insulation

SL2012-561/KBH
April 2012

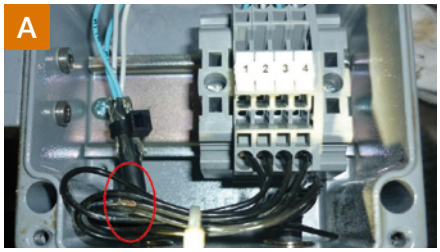
Concerns

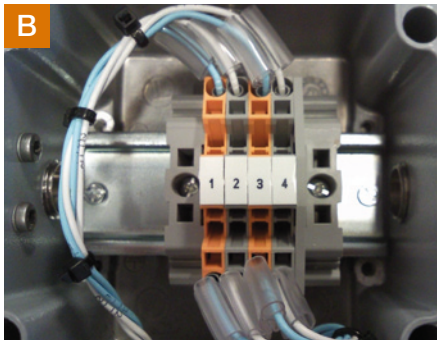
Owners and operators of MAN B&W ME/ME-C and ME-B engines in service and with the following ECS junction boxes installed:

- MTBFC&FF
- MTBEV
- MTBFB
- HCU J/B
- HPS J/B
- TSA-A and TSA-B

Summary

MAN Diesel & Turbo offers free rectification kits for chafed wires in ME ECS junction boxes causing ECS noise detection alarms due to periodic 24-VDC low insulation.





A: Chafed wires in MTBFP
B: Correctly installed wires in MTBEV

Dear Sirs

We have recently received a number of reports of ECS noise detection alarms caused by periodic low insulation. In many cases, the root cause has been found to be chafing of the wiring inside the locally installed ME ECS junction boxes. These alarms may arise when the engine is running and the wiring vibrates against the interior of the junction boxes.

In order to assist owners and operators of our ME/ME-C and ME-B engines with rectifying or preventing these incidents, we have decided to offer free-of-charge kits for rectification of each junction box affected.

These kits are tailored to fit each junction box type, and can be ordered free of charge from MAN Diesel & Turbo until 6 months from the date of this Service Letter.

Mail to primeserv-cph@mandieselturbo.com, and state plate No. 7972-4710-0001 (Spare Parts Kit for Rectification of Junction Boxes) and the junction box type (see page 2).

Yours faithfully

Mikael C Jensen
Vice President, Engineering

Stig B Jakobsen
Senior Manager, Engineering

Encl.: Troubleshooting Electrical Noise
Spare Parts Kit for Rectification of Junction Boxes

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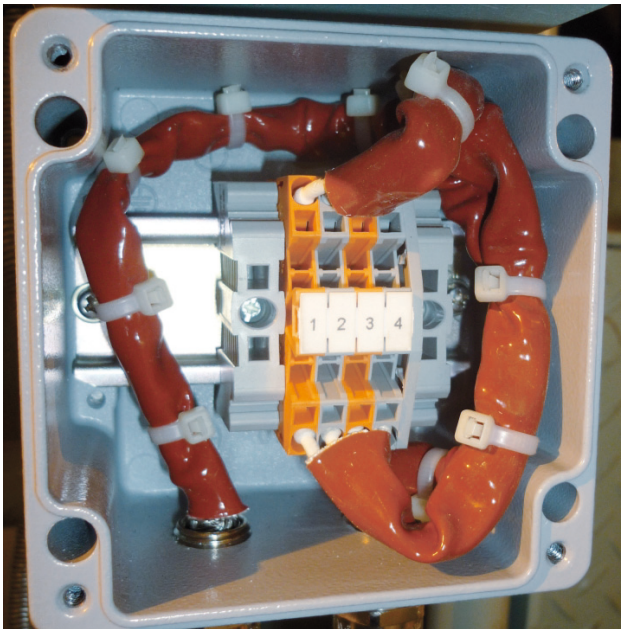
German Reg.No.: HRB 22056
Amtsgericht Augsburg

The kits contain the following (except tools) for easy rectification by the crew:

- Installation procedure
- Heat shrinking tube
- Wire ferrules
- Wire numbers
- Silicone flex tube
- Wire straps



MTBEV installed with the "silicone kit"

If noise detection alarms occur due to periodic low insulation in the 24-VDC ECS, we strongly recommend a visual inspection and rectification of the wiring in the below-mentioned junction boxes at the first opportunity. The free rectification kits can be ordered for:

- MTBFC & FF
- MTBEV
- MTBFB
- HCU J/B
- HPS J/B
- TSA-A and TSA-B.

In rare cases, incidents with chafed wires have also been reported from the following junction boxes:

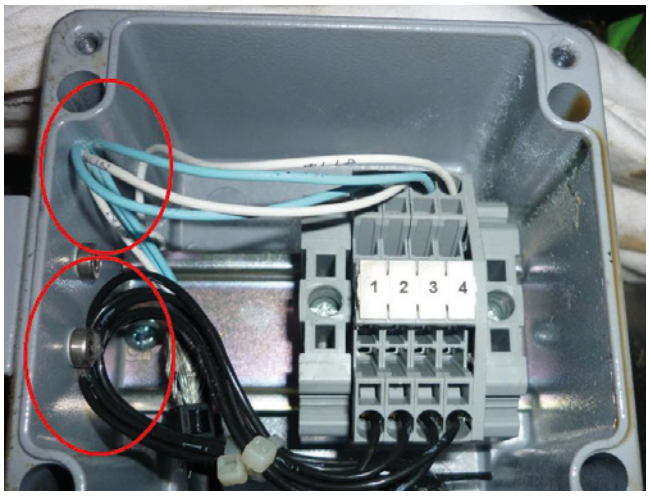
- TB-LOP
- LOP
- PDB
- TC cut-out.

It is also recommended to visually inspect and rectify the wiring inside these junction boxes, so as to ensure that no wires are in direct contact with the junction box interior or other ground-leading material.

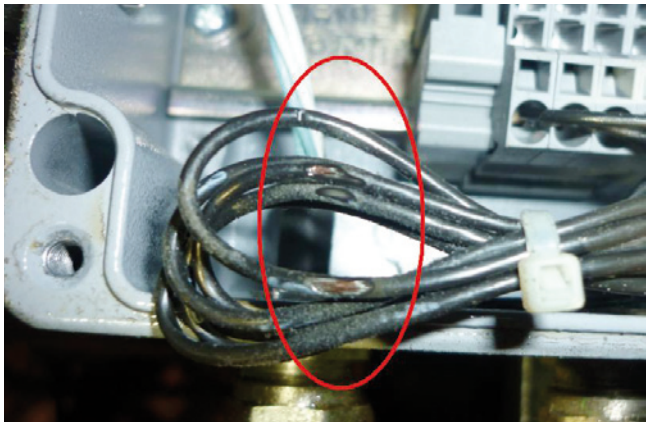
Rectification can be done easily with wire straps only.

For further troubleshooting, we refer to the enclosed guide, No. 3093078-1.
Questions or comments regarding this SL should be directed to Dept. LEO1 (e-mail: leo@mandieselturbo.com).

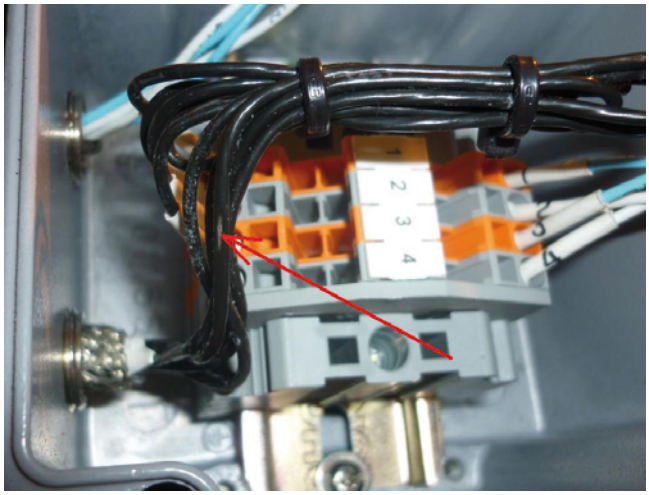
Examples of reported chafing of wires:



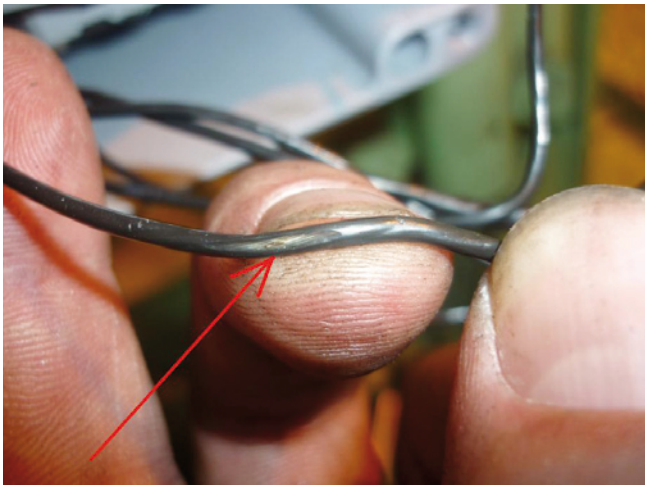
Chafed wiring inside an MTBFB



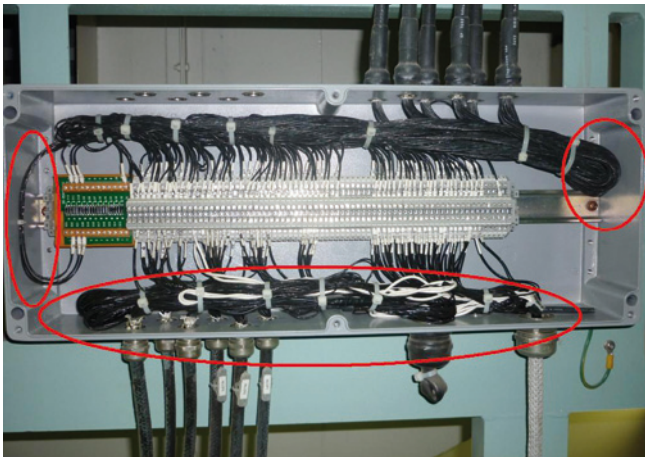
Chafed wiring inside an MTBFB



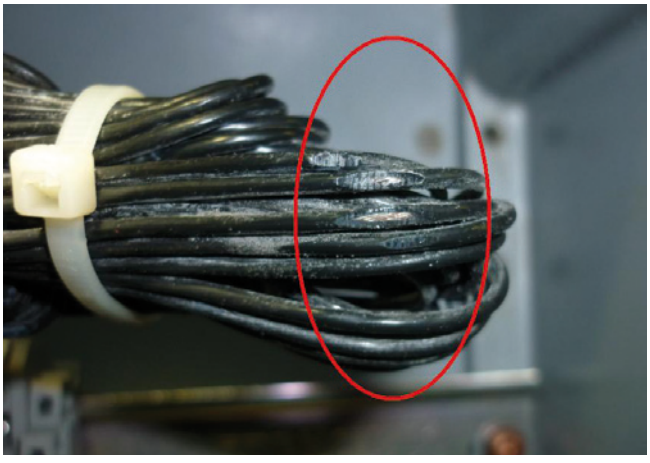
Chafed wiring inside an MTBEV



Chafed wiring inside an MTBEV

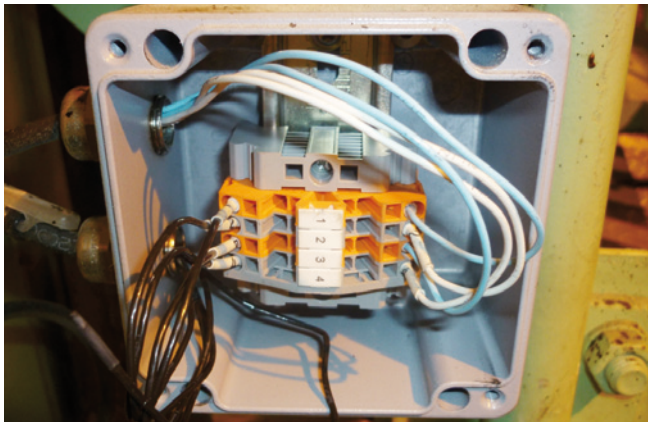


Wiring in contact with TB-LOP interior



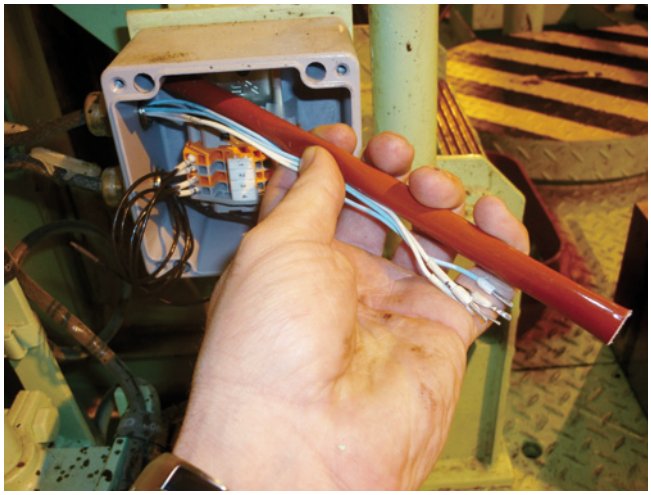
Chafed wiring inside a TB-LOP

Example of rectification of chafed wires in an MTBEV:



1. Switch off the power on the unit before starting the work.

2. Cut off the wire straps on the internal wiring.



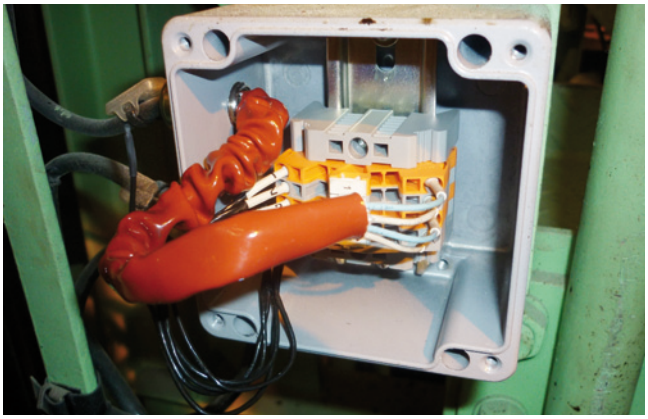
3. Check that the wires are all marked correctly and installed in the right terminals (correct numbers).

4. Dismantle the wires in one side of the terminal.

5. If wires are chafed, they have to be rectified with a heat shrinking tube or insulation tape.

6. Cut the silicone flex material so that it is 30 mm longer than the wires.

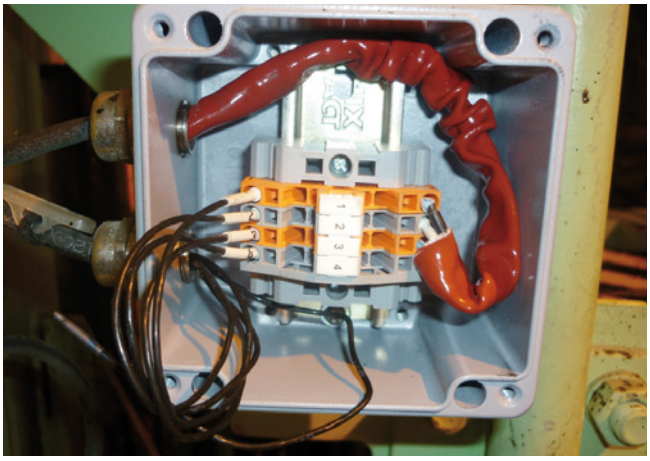
7. Check that the wire ferrules are properly installed.



8. Fit the silicone flex tube onto the wires (max. 5 wires inside one silicone flex tube).

9. Pull back the silicone flex tube on the wires, and install them in the terminal row.

10. Position the silicone flex tube on the wires so that they cover all the surface of the wires.

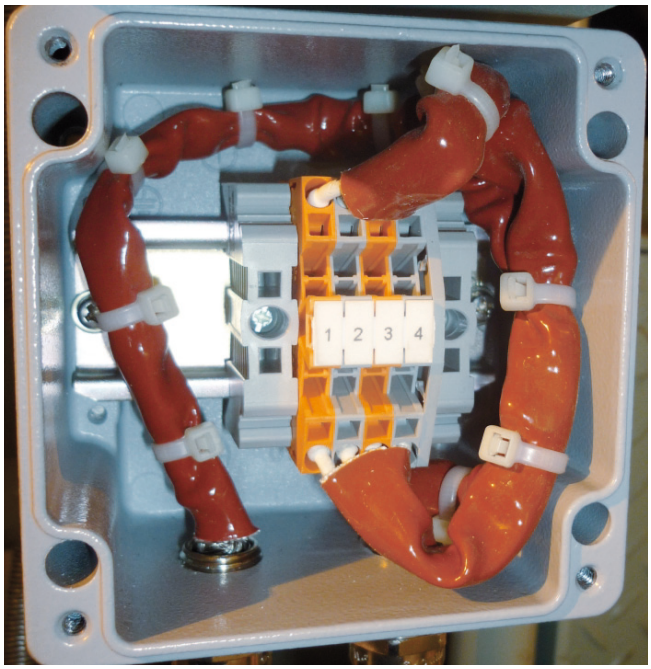


11. Push back the wiring in the silicone flex tube to a good position inside the junction box.

12. Fit the silicone flex tube onto the wires (max. 5 wires inside one silicone flex tube).

13. Pull back the silicone flex tube and install the wires in the terminal row.

14. Position the silicone flex tube on the wires so they cover all the surface of the wires.



15. Push back the wiring in the silicone flex tube to a good position inside the junction box.

16. Finish by applying wire straps on the silicone flex tubes.

Electrical Noise

Ident No.: 3093078-1

Troubleshooting Electrical Noise

This document is valid for existing engine types on order as of the date of this document:

Engine types: All

Quality Control

3093078-1.0

Febuary 2012

Info No: 393826

Structure No: 21-3800

Replaces:

Scope and Field of Application

The following instruction is made for Owners and Operators of our ME engines which experience “Electrical Noise Detect” alarms / Periodical low insulation in the 24 VDC ECS.

The instruction is valid for all MAN B&W electronically controlled engines ME/ME-C and ME-B, which have the “Electrical Noise Detect” functionality integrated in the ECS.

The instruction starts with a brief / general information regarding electrical noise, the installation, how it works, and the associated noise pulse counters.

Correct cabling is essential to avoid electrical noise

Document history

Date	Designer	Checked	AC	Revision change	Revision
2012-02-14	MSJ	NSL			0

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Contents

Changes

Since revision x

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1. Scope and field of application

The following instruction is made for Owners and Operators of our ME engines which experience "Electrical Noise Detect" alarms / Periodical low insulation in the 24 VDC ECS.
The instruction is valid for all MAN B&W electronically controlled engines ME/ME-C and ME-B, which have the "Electrical Noise Detect" functionality integrated in the ECS.
The instruction starts with a brief / general information regarding electrical noise, the installation, how it works, and the associated noise pulse counters.
After this, there is a small section concerning how to rectify wiring failures that might be found during the troubleshooting process.
This is followed by a troubleshooting flowchart. This flowchart is the main guide for finding and eliminating electrical noise.
Following the flowchart several examples are given from installations where the cause for electrical noise was found. These are intended as a guide in what to look for.

2. References

MAN B&W Production Specification:
0743606-1; Mounting and installation of electrical equipment

3. "Electrical noise" General Information:

The "Noise detect" functionality is implemented in order to track fast intermittent low insulation, which cannot be detected by the standard Bender isometer located in PSU-A.

Note! If the Bender isometer indicates a permanent low insulation, then this failure should be rectified before troubleshooting for electrical noise.

The term "Electrical noise" can to some extend be associated with the term "periodically low insulation", which can occur in a 24 VDC system where e.g. sensors are damaged or chamfered wiring are creating contact to the vessel's hull.
It is however most common to see these alarms arise in association with periodical low insulation.
When electrical noise is detected in an installation by the "Noise Detect" functionality, an alarm is raised on the MOP: "Electrical noise detected" (it can be raised separately on each CCU).
This alarm indicated on the MOP includes information regarding electrical noise, as well as a suggestion for how to find the source.
The method described in this document should be considered a supplement to those suggestions.
Compared to the method suggested on the MOP, the method described below would in general create less engine operational disturbances.
It can however take longer time to perform.
The following points are worth bearing in mind regarding the way the software handles the detection of the electrical noise:

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- The alarm for electrical noise will not in itself give any operational disturbances. I.e. it does not cause a slow down.
- If for some reason it is not possible to carry out troubleshooting immediately when the alarm for electrical noise occurs, then the Manual Cut Out Functionality on the MOP can be used to disable the alarm, until it is possible to start the troubleshooting.

3.1. The implementation of the “Noise detect” functionality

The “Noise detect” functionality is integrated in a special part of the CCU´s software called “burst” which samples with a rate of 2kHz.
The “Noise detect” functionality is only implemented on the CCU´s.
In addition to the software implementation there is also a hardware installation on the CCU’s in plug J35 as shown in figure 1.

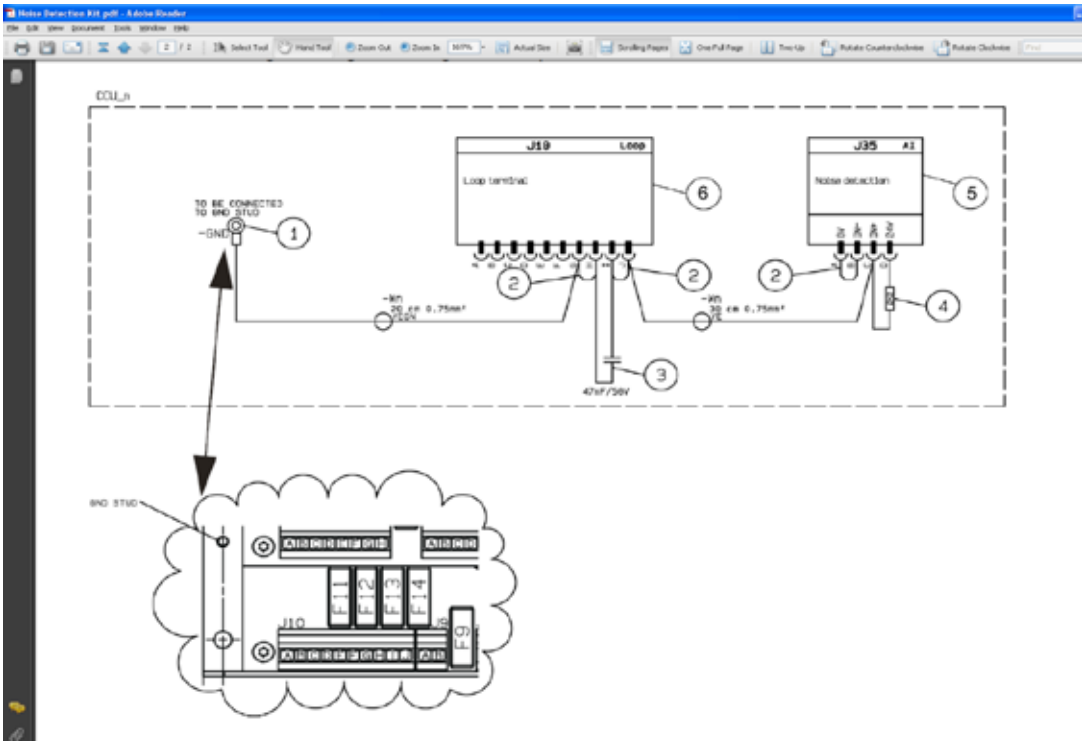

Figure 1: An illustration of the hardware installation part of the “Noise detect” functionality. The illustration is taken from S906-0048, issued by MAN Diesel & Turbo.‘1’ is a cable shoe connected to a ground stud, ‘3’ is a capacitor (47nF/50V) and ‘4’ is a 2k2Ω resistor.

As indicated on the above figure, the installation is a small current-loop in plug J35 connected to ground through a capacitor. The purpose of the capacitor is to provide additional gain in order to detect even very small electrical noise pulses.

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The “Noise detect” functionality is designed to be sensitive to even very small electrical noise pulses to supply an “Early Warning” – i.e. preferably before other parts of the ECS is influenced by the electrical noise.
The electrical noise pulses, if any, are sampled by the CCU and if the size of these exceeds a threshold value the alarm is triggered. Furthermore the CCU increments the electrical noise pulse counter (described more below).

3.2. The electrical noise pulse counters

Each CCU has a built in counter, which will count the rate of the experienced electrical noise pulses.
It can be observed on the MOP CH71 on each CCU. Figure 2

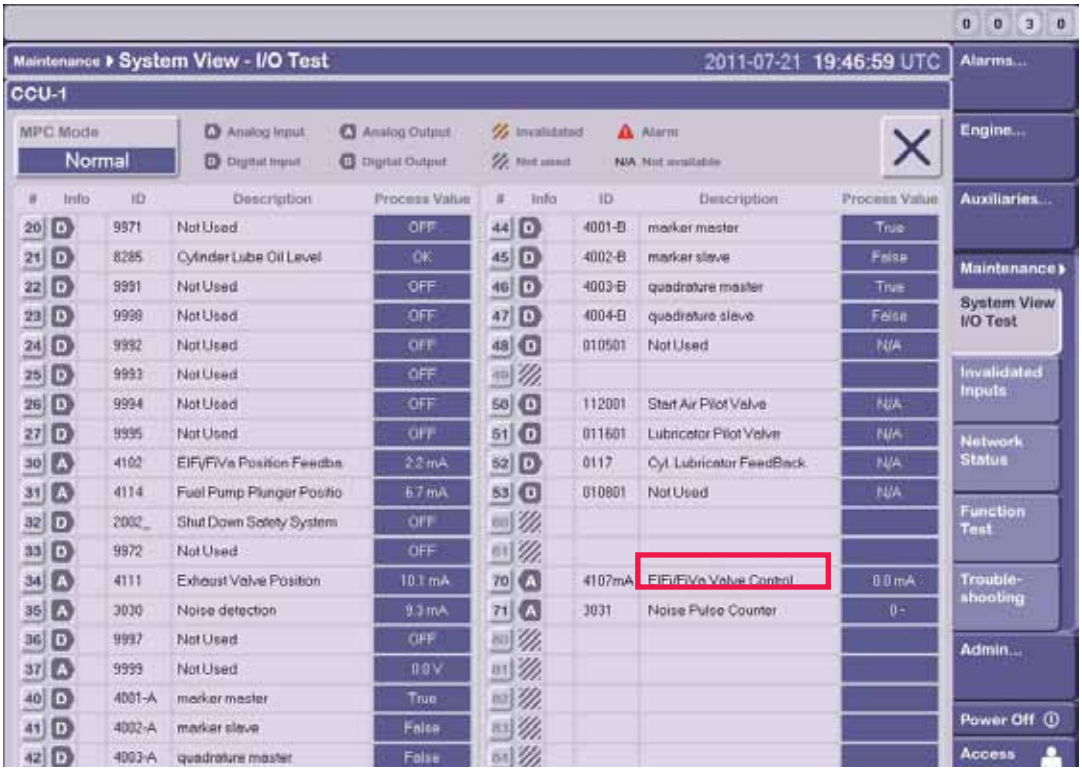

Figure 2:

The counters can be used both for showing the rate of the electrical noise, as well as give an indication of where the failure might be located.

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As all the “nodes” (MPC´s) are connected to the same 24 VDC power grid, than it will have a measurable effect on all “nodes” in a case of etc. a periodic low insulation fault, as it will travel back into the whole grid.
Therefore it can be concluded as follows:

- If all CCU noise pulse counters has the same (or close to) rate, then the error is most likely caused “externally” / not caused locally on the CCU´s.
- If one CCU noise pulse counter is much higher, compared with other CCU´s. Then the error is most likely “locally” on the CCU in question.

The noise pulse counters can also be viewed on the CoCoS EDS computer. Figure 3

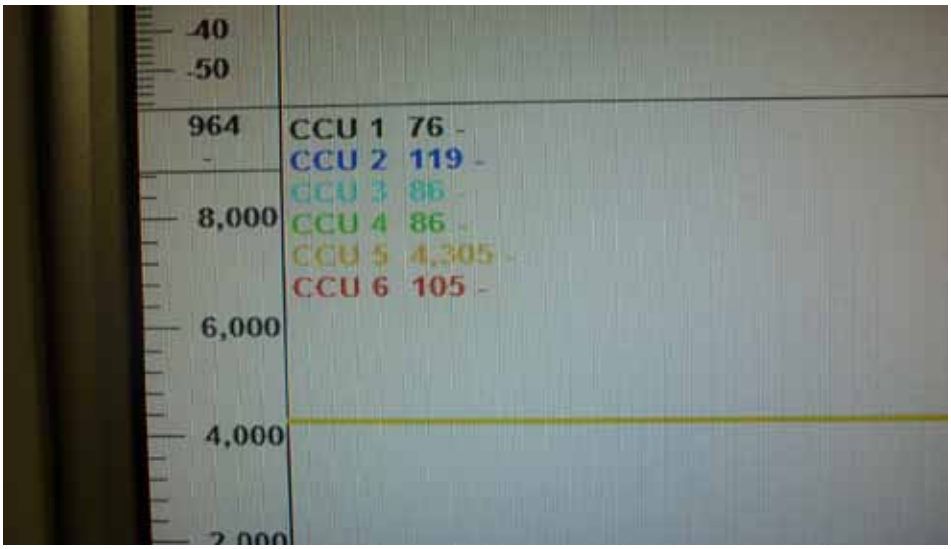

Figure 3: Example of very clear indication of an intermittent low insulation on CCU-5.This fault was located to be chamfered wires inside a MTBEV junction box.

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3.3. Troubleshooting

In most cases the “electrical noise detect” alarm is raised during engine operation, due to the engine vibrations having an impact on sensors and wiring.

When troubleshooting is carried out it should be kept in mind to start searching on the sensors / cabling and wiring, which are placed locally on the engine, as they naturally are the ones in the greatest risk of being damaged.

The below flow chart is in many cases enough, for troubleshooting these periodical low insulation faults.

In some cases it can be beneficial to supplement the troubleshooting with ohmmeter measurements. This is described in another troubleshooting guide by MAN Diesel & Turbo:

“MPC Earth-Finder user manual”

This guide relies on using a tool (MPC earth-finder) in combination with an ohmmeter, but the measurements can also be carried out using only an ohmmeter in case the tool is not available.
The tool can be purchased from:
Operation.spareparts@mandieselturbo.com

3.4. Rectifying wiring failures

Good electrical craftsmanship is the most important factor when fixing wiring problems. As can be seen from the pictures later in this document the main problem is wires inside junction boxes lacking support and therefore being chafed by the combination of touching the junction boxes and vibrations.
For input regarding correct cabling MAN Diesel & Turbo’s Product Specification “Mounting and installation of electrical equipment” (ident. number.: 0743606-1) can be consulted.
Additionally MAN Diesel & Turbo is as of February 2012 in the process of issuing a Service Letter containing explicit guidance and advice on how to protect the installation against wiers being chafed inside junction boxes.
Both of the above mentioned documents can be obtained by contacting:
leo@mandieselturbo.com

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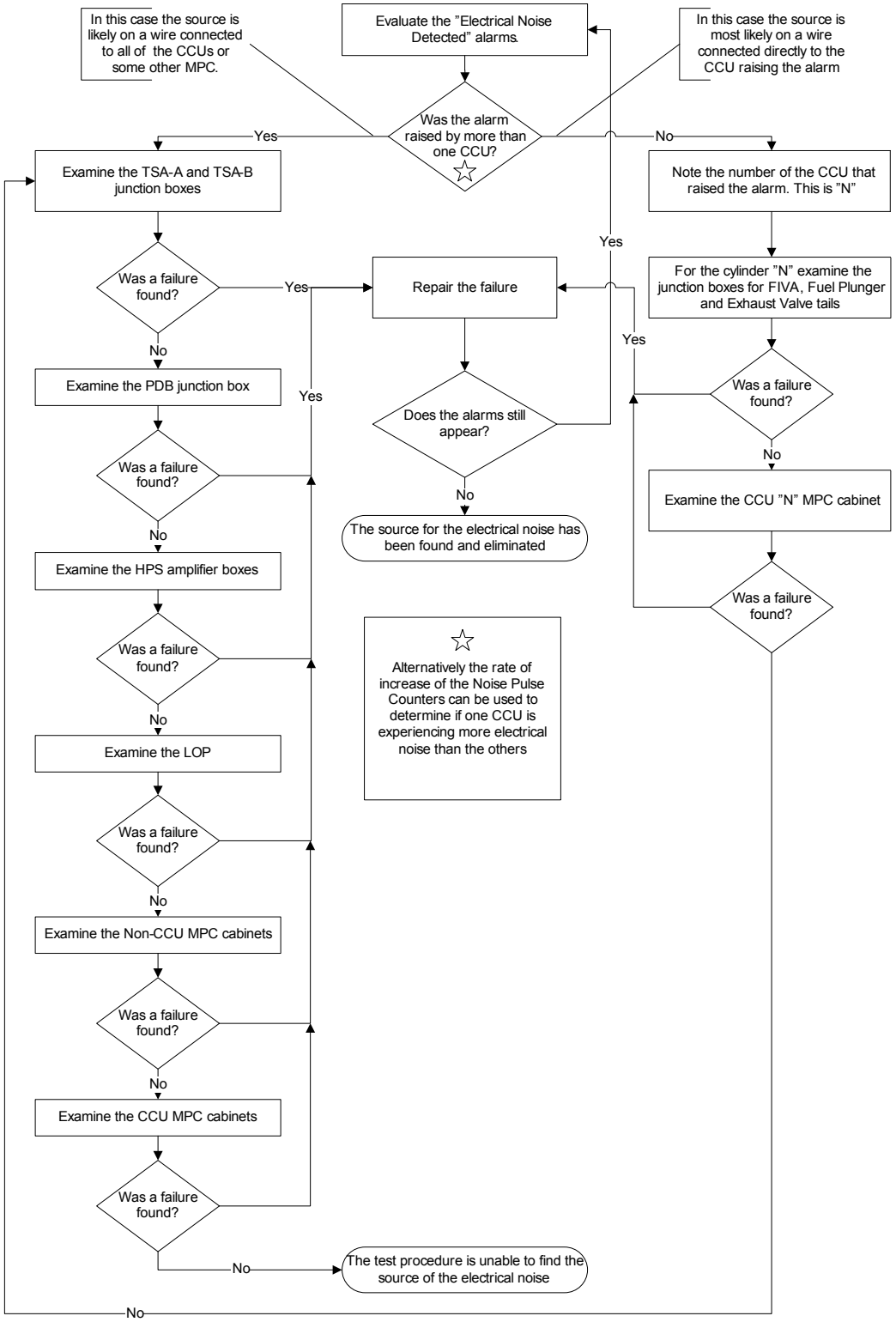
4. Troubleshooting flowchart



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5. Examples of sources of electrical noise

5.1. Example 1: Failure found in junction box for fuel plunger sensor tail:

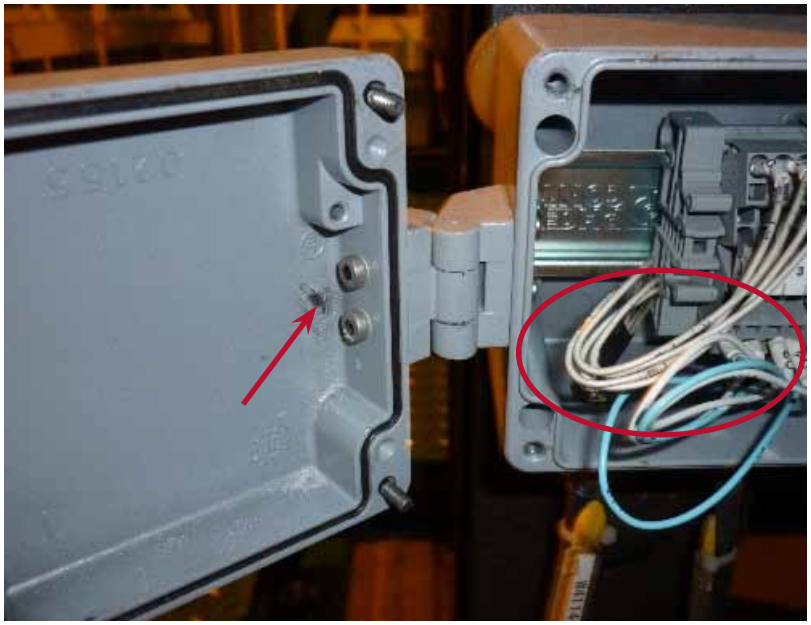

Figure 4: Upon opening the junction box it is apparent that the unsupported wires (red oval) have been chafing against the lid, causing a clear mark (read arrow).

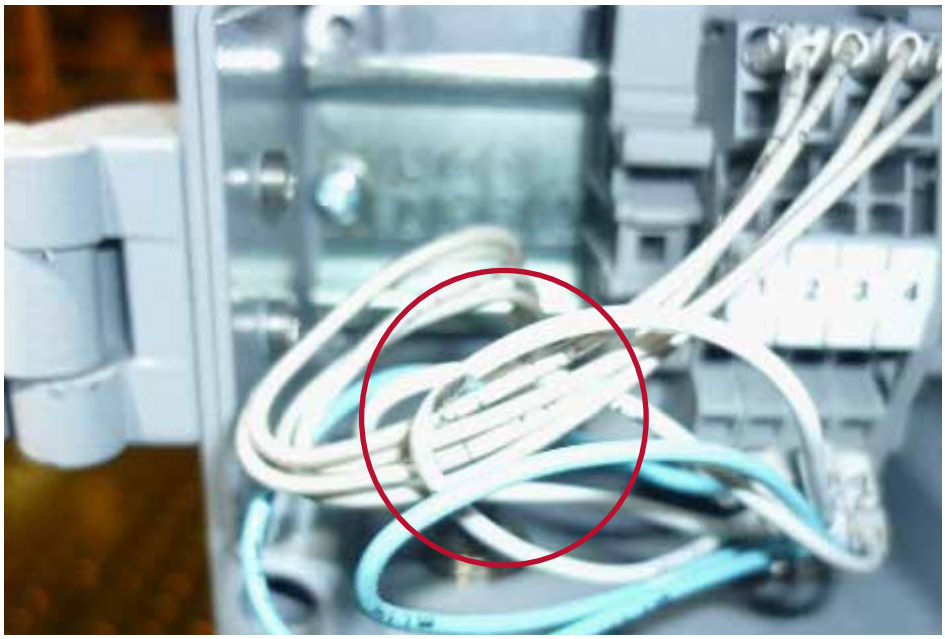

Figure 5: Examining the wires reveals that the insulation has been worn off (red circle); causing electrical noise whenever the uninsulated piece touched the side of the junction box.

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5.2. Example 2: Failure found in junction box for FIVA tail

Figure 6: Junction box for the FIVA tail. Lid closed.

Figure 7: When opening the lid it can be seen that one of the wires had been pinched when the junction box was last closed (red circle); causing penetration of the insulation.

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5.3. Example 3: Failure found in the TSA box

Figure 8: The open TSA box. Clearly showing the long, unsupported coil of wires (red oval).

Figure 9: Close-up of the end of the wire bundle, indicating how it can chafe against the box.

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Figure 10: After the wire bundle has been opened up, the failure in the insulation can be seen (red circle).

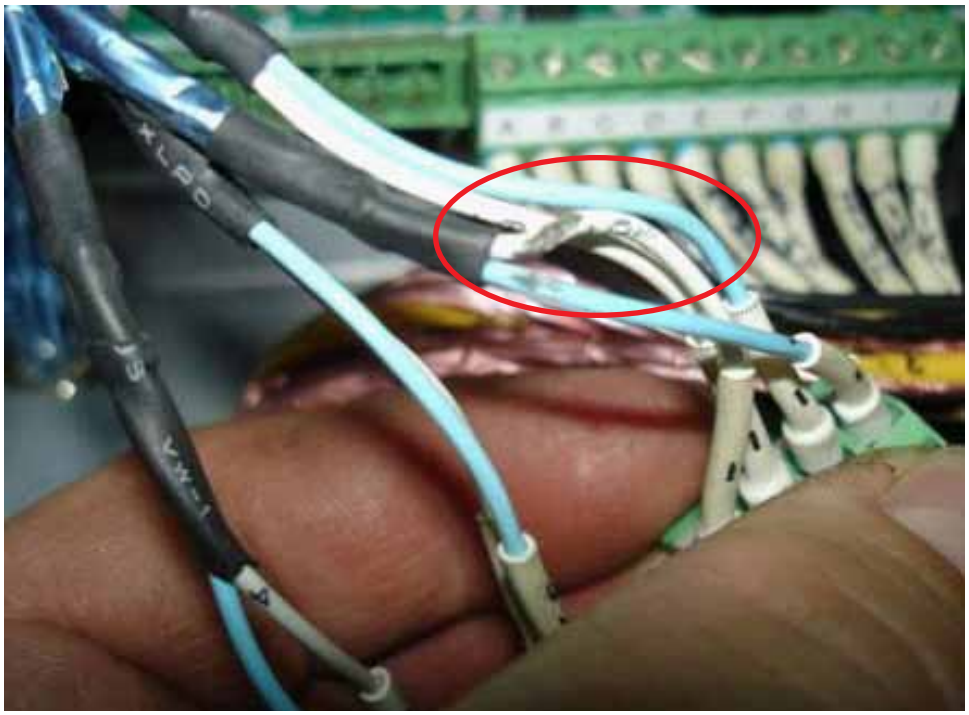

Figure 11: Additional chafing of the wires close to the plugs (red circle).

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5.4. Example 6: Failure in the HPS amplifier junction box

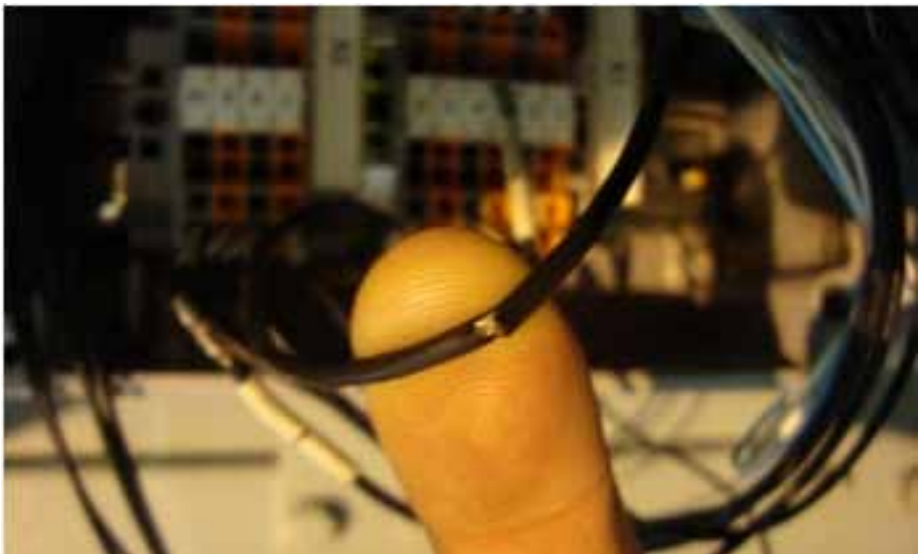

Figure 12: The wire with the insulation failure.

Figure 13: The wire after shrink tube has been used to cover the insulation failure. Additional repair will include making sure the wires are well supported and don't touch the junction box.

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5.5. Example 7: Failures in cabling into and between junction boxes

Figure 14: Cable damaged in connector to on/off valve for HPS pump.

Figure 15: Cable damaged in gland to fuel plunger sensor tail junction box.

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Figure 16: Wire protection broken; giving rise to sharp edges that can destroy the insulation of the wire.

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5.6. Example 8: Failures in various junction boxes

Figure 17: A long, unsupported wire bundle inside the junction box. Chafing against the side of the box.

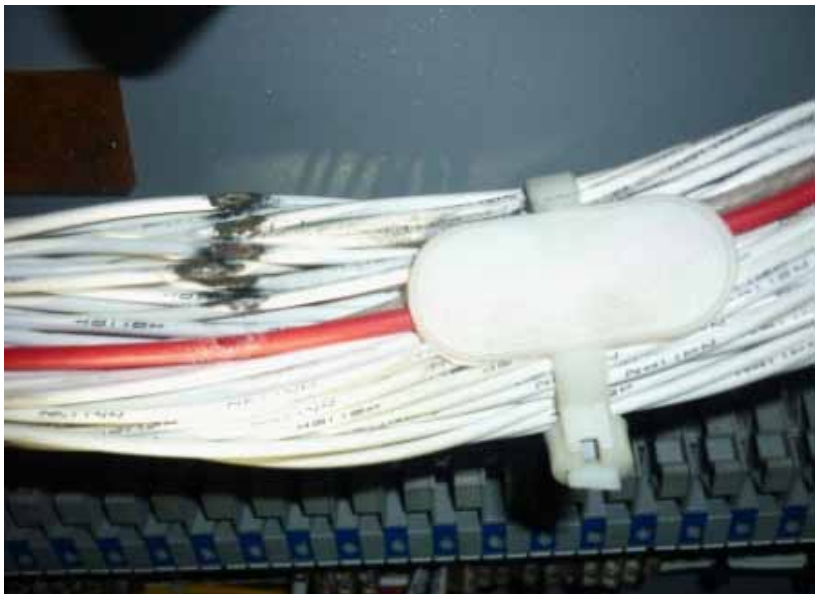

Figure 18: Close-up of the place where the insulation was worn off. Note this was on the rear side of the wires, therefore it was necessary to twist the bundle before the failure could be seen.

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Figure 19: A junction box with a long unsupported wire bundle

Figure 20: Red arrows indicating where the insulation was worn off.

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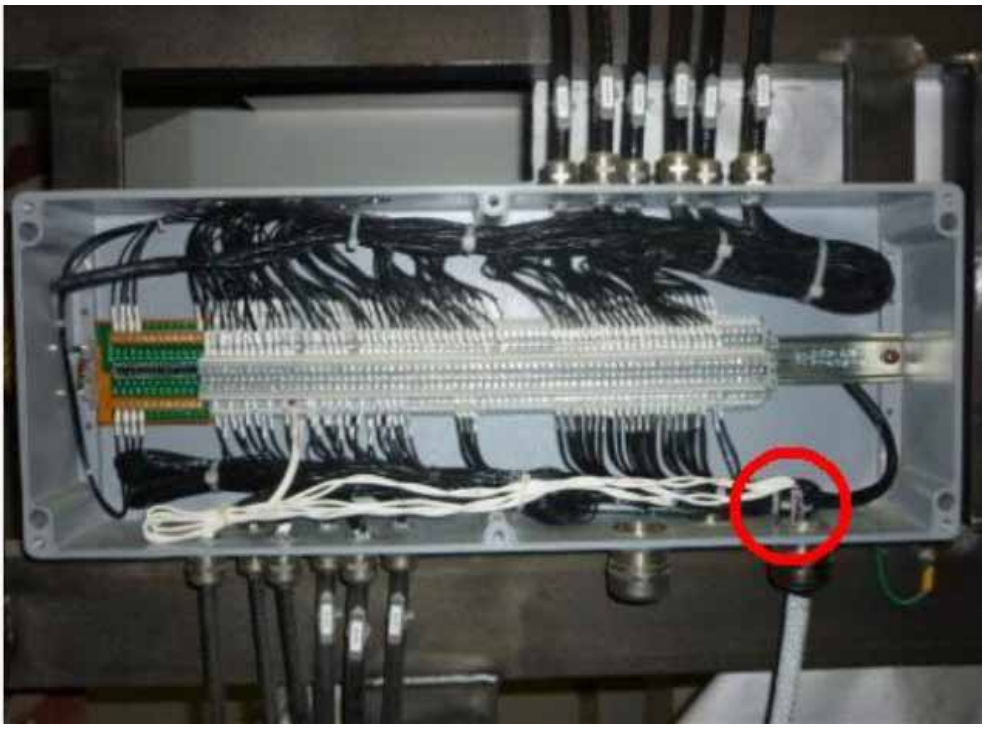

Figure 21: Junction box with a lot of unsupported wire bundles. The red circle indicates where chafing was most severe.

Figure 22: The resulting loss of insulation. Giving rise to the electrical noise.

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Figure 23: Unsupported wires. Leading to chafing and loss of insulation (red circle).

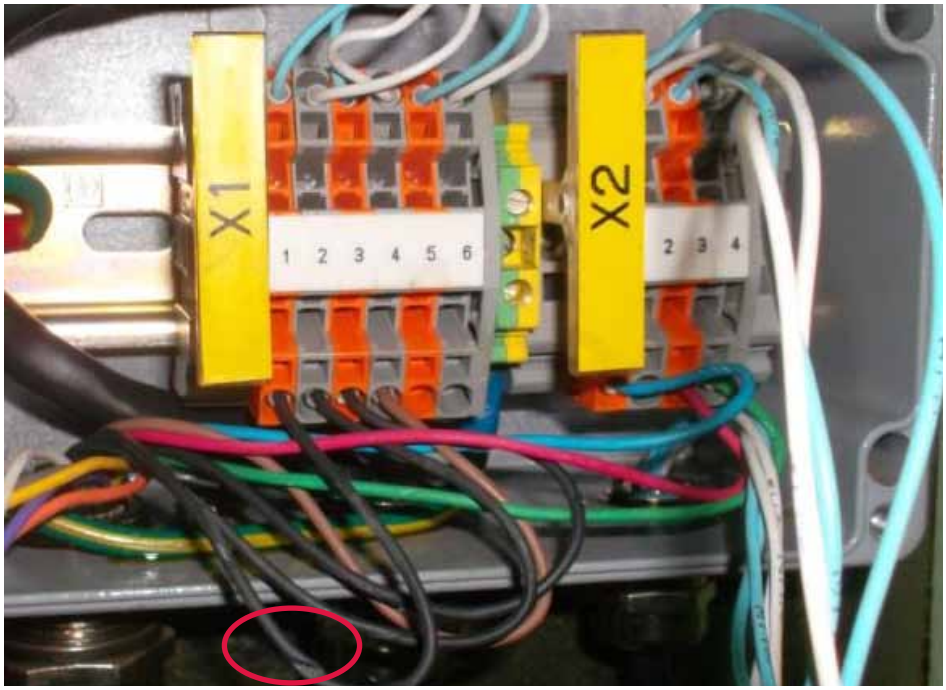

Figure 24: Unsupported wires. Leading to cables being pinched when the junction box is closed (red circle).

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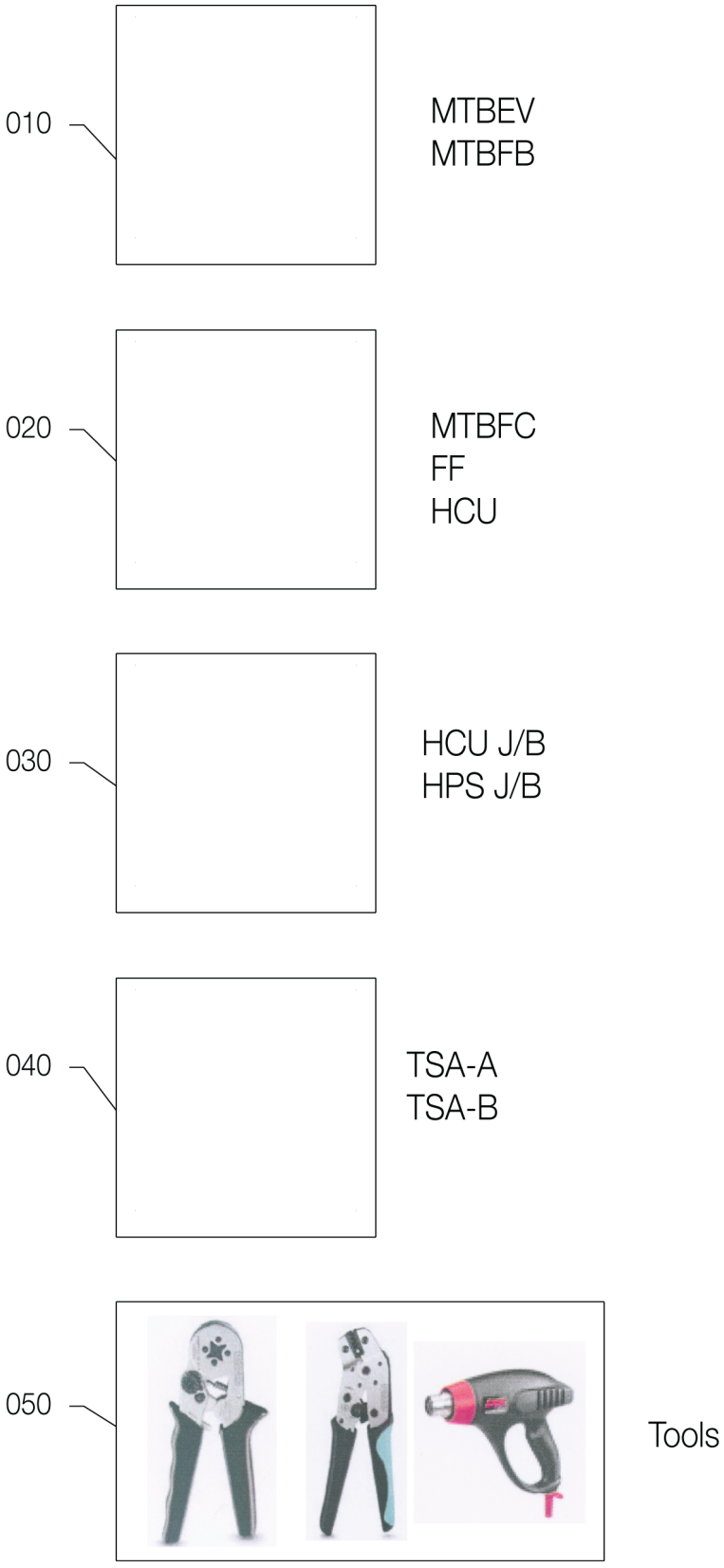

Spare Parts Kit for Rectification of Junction Boxes

Plate 7972-4710-0001

2012-04-12 - en

Spare Parts Kit for Rectification of Junction Boxes

Plate
7972-4710-0001

Item no	Qty	Designation
010	2	Rectification kit for MTBEV and MTBFB (2 pcs./Cyl.)
020	1	Rectification kit for MTBFC and FF and HCU (1 pcs./Cyl.)
030	3	Rectification kit for HCU J/B and HPS J/B (3 pcs./Engine)
040	1	Rectification kit for TSA-A and TSA-B (1 pcs./Engine)
050	1	Tools, complete (1 pcs./Engine)

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