Safety Notice
Health and Safety Alert Notice 02/03

Alstom K Series Relays manufactured between 1 October 1996 and 30 May 1997

ADVISORY

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SAFETY ALERT AUTHORISED BY:

Date:
13th November 2002

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MINISTRY OF DEFENCE

Safety Notice
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<td>02/01</td>
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<td>02/02</td>
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Alstom K Series Relays manufactured between 1 October 1996 and 30 May 1997

INTRODUCTION

1. THE CONTENTS OF THIS SAFETY ALERT ARE TO SECURE COMPLIANCE WITH THE HEALTH & SAFETY AT WORK ETC ACT 1974.

2. This Safety Alert is for the attention of Commanding Officers, Chief Executives, Heads of Establishment, Property Managers, Defence Lands Agents, Establishment Works Consultants (EWCs), Works Services Managers (WSMs), Authorising Engineers, Authorised Persons and Contractors involved in works for MOD.

3. This Safety Alert is to be read by all persons involved with any works associated with the equipment that is the subject of this Safety Alert.

4. The Property Manager or the appropriate MOD Officer shall arrange for the EWC and WSM to carry out all actions in accordance with this Safety Alert.

5. No work involving expenditure on an MOD account is to be carried out without authority from the Property Manager or the appropriate MOD officer for that location or facility.

6. Any work required as a result of this Safety Alert must be carried out in accordance with MOD Safety Rules and Procedures, as applicable.

7. Defects are to be immediately reported to the Property Manager or appropriate MOD Officer, who must ensure that appropriate operating restrictions on the equipment that is the subject of this Safety Alert are applied.

8. For MOD Establishments occupied by United States Visiting Forces (USVF), the responsibilities of Property Manager, EWC and WSM are jointly held by the USVF and DE(USF). At base level, this jointly managed organisation is to take appropriate action to implement the contents of this Safety Alert. Where this Safety Alert contains procedures which differ significantly from USVF practice, a DE(USF) Code of Practice section will be issued.
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REQUIREMENT

9. ACTION ADDRESSEES ARE TO ENSURE THAT THIS INFORMATION IS PASSED TO THEIR PROPERTY MANAGERS OR OTHER RESPONSIBLE OFFICERS WITHOUT DELAY.

10. This Safety Alert applies to Alstom 'K' series relays within the serial number bands identified in the attached letter, Appendix A, reference 866/NPS.

11. This Safety Alert is to be disseminated to all Authorised Persons (Electrical), through the Authorising Engineer (Electrical) as a matter of urgency.

12. Action as per Alstom's letter reference 866/NPS.

BACKGROUND

13. Electricity Association NEDER 2002/0509/00 notifies a K series relay failure to trip in service due to a faulty capacitor.


END OF SAFETY ALERT
Dear Sirs

K PRODUCT NOTICE: K-SERIES 1 ELECTROLYTIC CAPACITOR S9638

We wish to inform you that a number of K-Series 1 products despatched between 1 October 1996 and 30 May 1997 may be unable to operate all of their output contacts. The problem relates to an electrolytic capacitor with a date code S9638, fitted to the power supply board.

This problem is fully detailed in the appended engineering report reference ‘50261.FR0014’. As mentioned in the report, the symptoms of the problem manifest with the product performing a warm restart when one or more output contacts are energised. The product is not able to power some or all of its output contacts and therefore may not trip for system fault conditions.

The table below identifies the serial number range of product that could be at risk.

If a product does fall within the serial number range, then please contact our After Sales Service Department who will carry out further investigation.

The contact details of our After Sales Service Department are:

Mr Rod Baigent
Tel: 01785 272434
Fax: 01785 227729
Email: rod.baigent@tde.alstom.com
If after further investigation a product is identified as being at risk, then a specific customer action plan will be formulated.
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**Model Type**

<table>
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<tr>
<th>Model Type</th>
<th>Serial numbers that could be at risk and require further investigation</th>
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<tr>
<td>KAVR100</td>
<td>030223J to 038821J and 603021H to 855305H</td>
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<td>KBCH120</td>
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<td>KCEG150</td>
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<tr>
<td>KCEG160</td>
<td>707522H to 707536H</td>
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<td>KCEU140</td>
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<td>KCEU141</td>
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<td>KCEU150</td>
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<td>KCEU241</td>
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<td>KCGG110</td>
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<td>KCGG140</td>
<td>001322J to 041725J and 429747G to 510387G and 623843H to 855935H</td>
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<tr>
<td>KCGG210</td>
<td>714892H to 735525H</td>
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<tr>
<td>KCGG230</td>
<td>718003H to 855144H</td>
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<td>KCGG240</td>
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<td>KCGU110</td>
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<td>KVTR102</td>
<td>011291J to 011307J and 751947H to 848650H</td>
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In the event you have products falling within the serial number ranges quoted above, indication of the ability of the product to clear system fault conditions can be given. This is achieved by performing a trip test on the product and the procedure is described in the enclosed document ‘Operating Output Contacts on K Relays’.

It is regrettable that this problem has arisen and we apologise for any inconvenience that may arise.

Yours faithfully

[Signature]

N P Sproston
UK Utility Segment Co-ordination Manager
ALSTOM T&D Ltd – Protection & Control

Enc. Engineering report: 50261.FR0014
Procedure: Operating Output Contacts on K Relays
Fault Report  
K-series Capacitor malfunction

AUTHOR: PAUL GRANTHAM

SUMMARY:

There have been several reported instances where K-series products have not been able to operate all of their output contacts.

The symptoms of the problem manifest with the relay performing a warm restart when one or more output contacts are energised. The relay is not able to power its output contacts and therefore cannot trip for system fault conditions.

The cause of the warm restart is due to a capacitor in the 5V rail of the power supply. During quiescent conditions, minimum load, the capacitor is able to hold up the 5V rail between its operational limits. However, during load conditions, up to maximum load, the capacitor is unable to maintain the current drain on the 5V rail and the voltage falls outside of the limits. The 5V monitoring circuit sees the voltage dip and resets the microprocessor IC. If the relay powers back up onto a trip condition then multiple warm restarts can occur, with the result that the output contact does not operate.

The capacitor manufacturer has concurred that there is one specific date code batch of capacitors that are at risk to an early life failure. Date code S9638 6.3V 4700uF capacitors fitted to power supply boards ZJ0283 are the only devices affected by these low levels of electrolyte. All other batches received have been checked with the manufacturer and have been found to be satisfactory.

K-series relays manufactured between 1 October 1996 and 30 May 1997 may contain capacitors from the affected batch.

Customer queries and co-ordination of site modifications are to be controlled by the After Sales Service Department, Stafford.
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1. INTRODUCTION

After several years service in the field, reports have been received where a small number of K-series products had not been able to operate all of their output contacts during routine maintenance checks. In addition, some of the products had exhibited blocks on the LCD.

Several products returned have been the subject of an Engineering investigation to establish why the relays exhibited the above problems.

No design changes have been made to the 5V-power supply circuit and therefore the investigation concentrated on possible component differences.

Reported instances have been received from several countries, therefore temperature and environmental conditions were not of major influence. However, all of the reports were for products manufactured in the last quarter of 1996 and the first half of 1997.

We immediately identified the root cause of the reported malfunctions as a collapse of the 5V rail during load conditions. We were then able to identify the problem as being related to a smoothing electrolytic capacitor, all with the same date code of manufacture.

2. SYMPTOMS OF MALOPERATION

In all reported instances there was an inability of the K-series relay to operate all of its output contacts. Therefore there is a possibility that system protection may be reliant upon backup or upstream protection to clear faults.

Under quiescent conditions, when the relay is powered up but there are no opto inputs or relay outputs energised the relay appears to be healthy. The 5V rail is sufficient to power the digital circuitry on the processor board.

When one or more output relays are energised the current drain on the 5V rail increases to operate the output relay coil. On relays containing a capacitor from the affected batch the capacitor is not able to supply the increase in power and the 5V rail collapses. This causes the 5V monitoring hardware to trigger and cause a reset of the microprocessor.

When the processor resets back onto a system fault condition then the same process will repeat and the relay will reset until the condition is cleared.

In the most extreme circumstances where the capacitor has completely failed then blocks may be visible on the relay display or the relay will not power up.

3. CONDITIONS AFFECTING CAPACITOR MALOPERATION

The only condition affecting the failure of the capacitor is operational life. Because the affected batch of capacitors is at risk, the life expectancy for the devices is reduced.

All of the reported instances have been for products that have been operational and in service for greater than 5 years.
Over a period of time the capacitor is degrading internally and a reduction of the capacitance is observed, along with an increase in the capacitors TanD parameter. These physical changes within the capacitor structure affect the operation of the device eventually causing failure under load conditions.

4. CONCLUSIONS

A known batch of K-series products manufactured between October 1996 and May 1997 may be affected.

In all instances, this problem has occurred during the operation of a number of output contacts on a product which has been in active service for greater than 5 years.

The operational life of the component is the only influencing factor relating to the component failure. Higher operating temperatures will have an effect on all electrolytic capacitors life expectancy; therefore this is not an influencing factor in the early life failures.

Although only a small number of products manufactured during the suspect period have been reported as defective, the seriousness of a potential loss of protection on a system has premeditated the implementation of an action plan to achieve the least disruption to service whilst maintaining the highest standard of product reliability.

5. ACTION PLAN

- All customer relays can be checked against a known list of relay serial numbers. Further details can be obtained by contacting the After Sales Service Department at Stafford.

- If necessary, ALSTOM personnel can visit site to perform rectification action. This can include identifying suspect products (i.e. those which contain the specific S9638 date code capacitor) and replacing the power supply board.

- Small quantities of loan relays can be made available to facilitate any site rectification work.

- Products will not be replaced, only replacement boards are required since each board is individually functionally tested at the factory and requires only commissioning checks to establish operation of the protection functions.

- Identified K-series products can also be returned to a local ALSTOM Service Centre or direct to the factory in Stafford for board replacement and test.