



Marine Electrical Thermographic Survey

Sample Report

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By

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This sample report contains a number of typical examples of the types of fault that can be detected during a marine electrical thermographic survey.

Surveys are carried out without disrupting the operation of the vessel and without interfering with equipment making this type of survey an invaluable way of identifying problems which if left alone could result in breakdown or risk of fire.

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SCOPE OF SURVEY

The scope of this survey was to carry out a thermographic inspection of the electrical equipment on the vessel. This comprised of the following systems or components:

- Electrical Switchboards
- Electrical Distribution Boards
- Plant Control Panels
- Bridge Panels

A detailed schedule of all equipment inspected can be found at the back of this report.

REPORT DATA

A summary of all thermographic data is contained in the report pages that follow. The pages in the report have been designed as single page entries, each of which carries its own information so that individual pages can be given to the relevant professions in order that they may carry out any remedial repairs that may be necessary.

INFRARED ELECTRICAL INSPECTIONS

All electrical distribution equipment is subject to mechanical deterioration at connections, joints and contacts due to looseness, over-tightening, corrosion and contamination. If these conditions remain uncorrected further deterioration will occur resulting in equipment failure, fire and possible explosions.

FAULT SITE CONDITIONS

The pages contained within this report have been designed so that the thermal images show temperature differences between components. These differences typically represent the early stages of a fault site. The temperature relationship between a fault site and the external measurable surfaces will be determined by the nature of heat transfer paths, which may contain conducting materials, insulating materials or even air gaps. All of these must be considered during the image analysis process. Increases in circuit current will have an exponential effect on power dissipation with a corresponding increase in temperature of the surface being measured.

ELECTRICAL STANDARDS

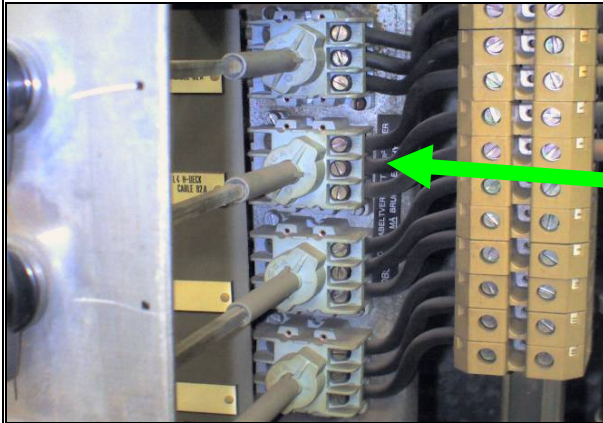
Important to the evaluation process is the standards and guidance available regarding maximum operating temperatures for electrical components and materials. This information is provided in British Standards where two temperature criteria are listed. One is the maximum operating temperature and one is the maximum differential temperature rise relative to ambient temperature. Both are of consequence to the Thermographer.

The maximum operating temperature indicates the absolute temperature that must not be exceeded irrespective of ambient conditions. The differential temperature, however, will give perspective to measured temperatures as the higher the ambient temperature the higher the temperature the component will be operating at. The actual temperature of the component will therefore be a combination of the ambient temperature plus operational and resistive influences.

Summary of Issues Found

Location	Equipment	Type	Priority	Page Number
Main Control Room	Main Switchboard (Aft)	Panel 14 - Isolator Phase 2 Connection	2	4
Main Control Room	Main Switchboard (Aft)	Panel 15 - Bottle Fuse - Lighting Board L11 Phase 3	1	5
Main Control Room	Main Switchboard (Central)	Panel 5 - Main Breaker - Phase 2 & 3	1	6
Main Control Room	Main Switchboard (Central)	24V Simos Alarms Negative Battery Connection	2	7
Generator Room	DB Engine Panel 2	Bottle Fuse - Fresh Water Hydro FGR Pump - Phase 2	2	8
Level 7 - Galley	Hot Plate Control Panel	Termination in Base of Panel	2	9

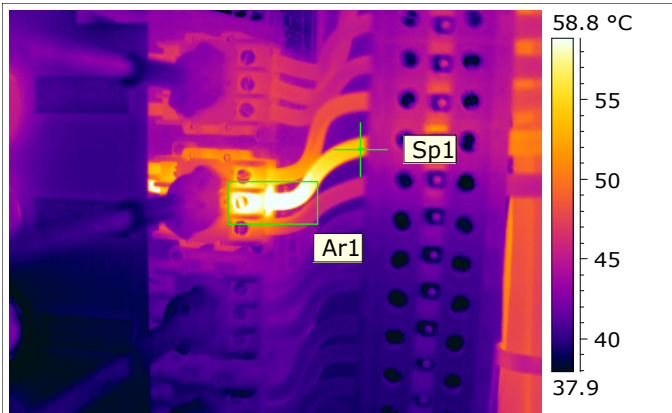
VISUAL IMAGE



EQUIPMENT INFORMATION

Location	Main Control Room
Equipment	Main Switchboard (Aft)
Type	Panel 14 - Isolator Phase 2 Connection

THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	25.0 °C
Emissivity	0.95
Object Distance	1.5 m
Reflected Apparent Temperature	25.0 °C
Image File name	IR_6723.jpg
Sp1 Temperature	53.9 °C
Ar1 Max. Temperature	71.4 °C
Difference Ar1 - Sp1	17.5 °C
Fault Rating	Priority 2

ANALYSIS & OBSERVATIONS

Elevated temperature noted on isolator outgoing phase 2 connection.

Current measurements indicate that imbalanced load is not the cause of this anomaly.

Likely cause of heat rise is a poor or loose connection.

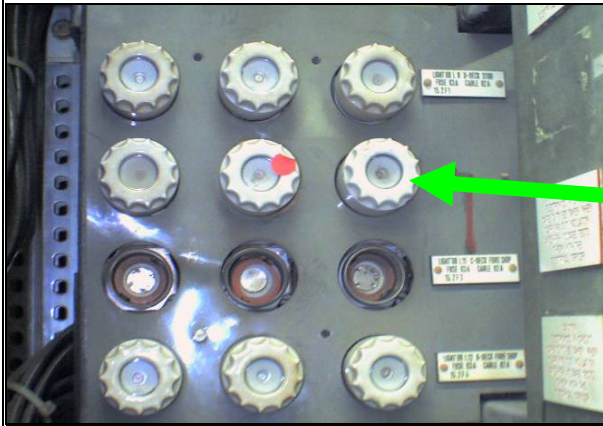
Recommendation is to inspect, clean and remake off this connection.

Repaired by:.....

Date:

Comment:.....

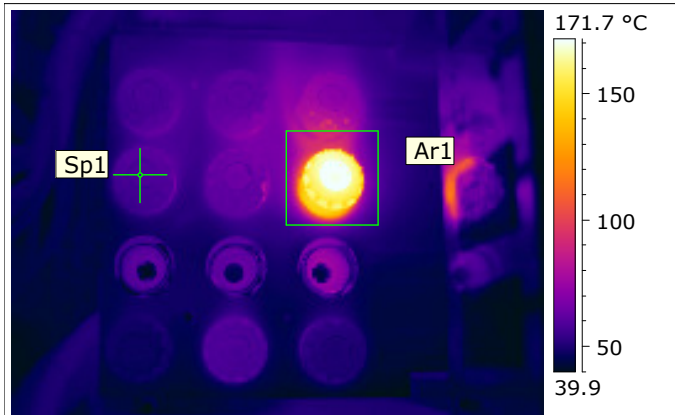
VISUAL IMAGE



EQUIPMENT INFORMATION

Location	Main Control Room
Equipment	Main Switchboard (Aft)
Type	Panel 15 - Bottle Fuse - Lighting Board L11 Phase 3

THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	25.0 °C
Emissivity	0.95
Object Distance	1.5 m
Reflected Apparent Temperature	25.0 °C
Image File name	IR_6727.jpg
Sp1 Temperature	58.9 °C
Ar1 Max. Temperature	193.8 °C
Difference Ar1 - Sp1	134.9 °C
Fault Rating	Priority 1

ANALYSIS & OBSERVATIONS

Significantly elevated surface temperatures noted on bottle fuse carrier.

Likely causes of heat rise include dirty or pitted conductive surface, loose or poorly fitted fuse carrier or poor outgoing connection at rear.

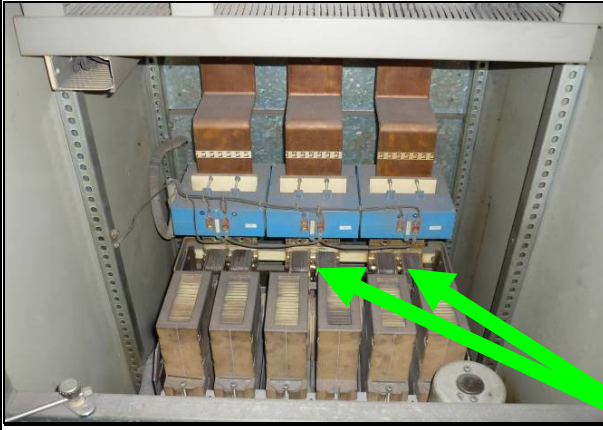
Recommendation is to remove the carrier, replace the fuse, check all surfaces are clean and re-install the carrier ensuring it is tight.

Repaired by:.....

Date:

Comment:.....

VISUAL IMAGE



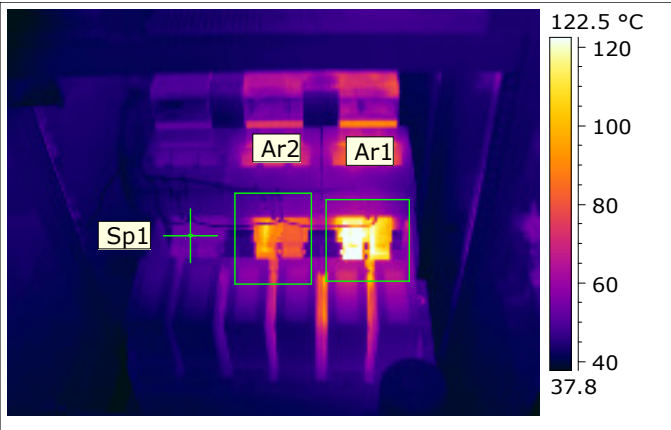
EQUIPMENT INFORMATION

Location	Main Control Room
Equipment	Main Switchboard (Central)
Type	Panel 5 - Main Breaker - Phase 2 & 3

RATING OF EQUIPMENT

Phase	Measured Current (Amps)
Red	550 Amps
Yellow	550 Amps
Blue	550 Amps

THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	25.0 °C
Emissivity	0.95
Object Distance	1.5 m
Reflected Apparent Temperature	25.0 °C
Image File name	IR_6731.jpg
Sp1 Temperature	53.4 °C
Ar1 Max. Temperature	163.9 °C
Ar2 Max. Temperature	111.6 °C
Difference Ar1 - Sp1	110.5 °C
Fault Rating	Priority 1

ANALYSIS & OBSERVATIONS

Significantly elevated temperatures noted on the contacts of Phases 3 and 2 of the circuit breaker.

Likely cause of this heat rise is poor or dirty connections between the breaker and the contact.

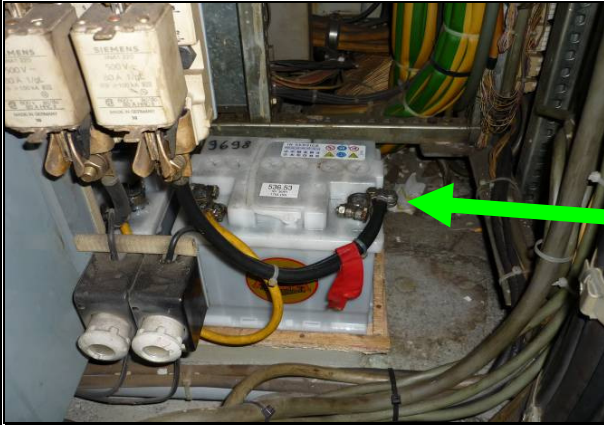
Recommendation is to remove and completely clean the connections and contacts of phases 2 and 3.

Repaired by:.....

Date:

Comment:.....

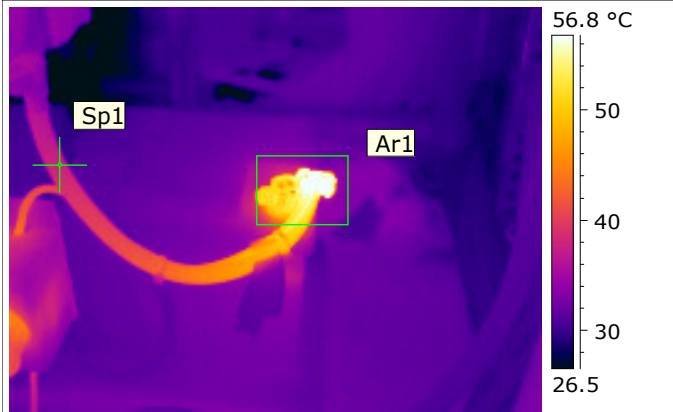
VISUAL IMAGE



EQUIPMENT INFORMATION

Location	Main Control Room
Equipment	Main Switchboard (Central)
Type	24V Simos Alarms Negative Battery Connection

THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	25.0 °C
Emissivity	0.95
Object Distance	1.5 m
Reflected Apparent Temperature	25.0 °C
Image File name	IR_6733.jpg
Sp1 Temperature	37.9 °C
Ar1 Max. Temperature	61.3 °C
Difference Ar1 - Sp1	23.5 °C
Fault Rating	Priority 2

ANALYSIS & OBSERVATIONS

Elevated temperature noted on battery negative connection.
Likely cause of heat rise is a poor or loose connection.
Recommendation is to inspect, clean and re-tighten this connection.

Repaired by:.....

Date:

Comment:.....

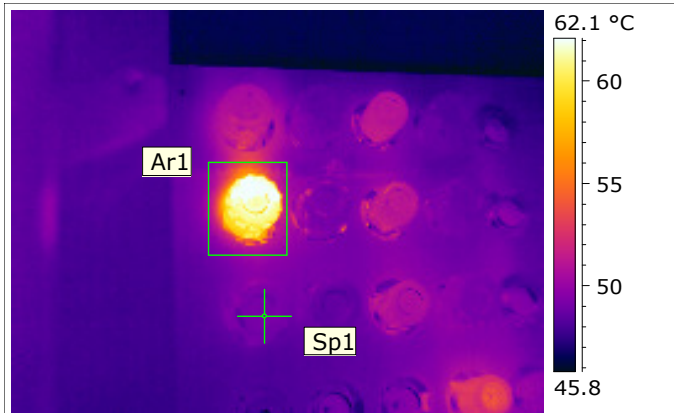
VISUAL IMAGE



EQUIPMENT INFORMATION

Location	Generator Room
Equipment	DB Engine Panel 2
Type	Bottle Fuse - Fresh Water Hydro FGR Pump - Phase 2

THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	36.5 °C
Emissivity	0.95
Object Distance	1.5 m
Reflected Apparent Temperature	36.5 °C
Image File name	IR_6754.jpg
Sp1 Temperature	49.3 °C
Ar1 Max. Temperature	64.5 °C
Difference Ar1 - Sp1	15.2 °C
Fault Rating	Priority 2

ANALYSIS & OBSERVATIONS

Elevated surface temperatures noted on bottle fuse carrier.

Likely causes of heat rise include dirty or pitted conductive surface, loose or poorly fitted fuse carrier or poor outgoing connection at rear.

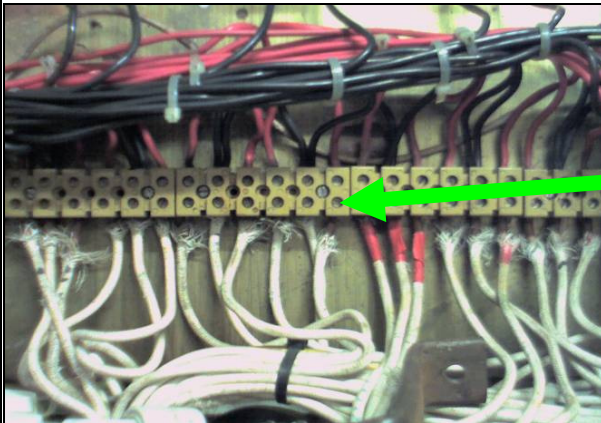
Recommendation is to remove the carrier, replace the fuse, check all surfaces are clean and re-install the carrier ensuring it is tight.

Repaired by:.....

Date:

Comment:.....

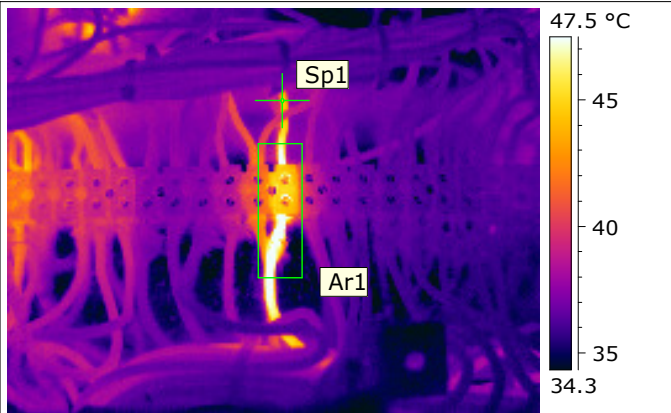
VISUAL IMAGE



EQUIPMENT INFORMATION

Location	Level 7 - Galley
Equipment	Hot Plate Control Panel
Type	Termination in Base of Panel

THERMAL IMAGE



RADIOMETRIC DATA

Object Parameters	Value
Atmospheric Temperature	32.3 °C
Emissivity	0.95
Object Distance	1.5 m
Reflected Apparent Temperature	32.3 °C
Image File name	IR_6774.jpg
Sp1 Temperature	44.4 °C
Ar1 Max. Temperature	54.9 °C
Difference Ar1 - Sp1	10.6 °C
Fault Rating	Priority 2

ANALYSIS & OBSERVATIONS

Elevated temperature noted on terminal connection.
Likely cause of heat rise is a poor or loose connection.
Recommendation is to inspect, clean and remake off this connection.

Repaired by:.....

Date:

Comment:.....

The following plant and panels were inspected during the survey:

A full inventory of inspected panels, systems or items would appear on this and subsequent pages.