

Case study 1

DC 24V UPS CAMS ABNORMAL

CMA CGM THALASSA

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Type of CAMS: SAM electronics MCS2200

Problem:

During maneuvering and cargo operations AMS is displaying intermittent alarms on every card in FPD6 causing M/E slowdown and shutdown due to faulty high high alarms in every temperature sensor in FPD6. FPD6 monitors JCFW temperatures, M/E EXH.GAS temperatures and TC Inlet temperatures. AMS displays temperatures higher than normal by no less that 30 C. Cards that go in alarm are analog signal type. Digital input cards are not affected by this problem.

Measures taken:

a)In common with all analogue and digital cards are Digital processor cards known as ZM-411.

Replaced ZM-411 with the one from FPD2. Problem still occurs on FPD6. ZM-411 eliminated as source of the problem

b)During inspection of alarms it has shown that it starts always from the MXM multiplexer card no. 604 which is the last in line of connection.

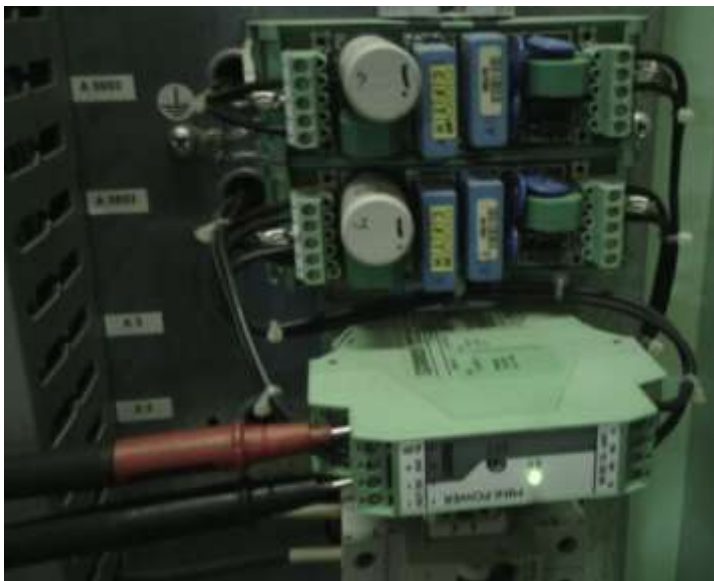
Replaced MXM604 card with new one. Problem still occurs on FPD6. MXM604 eliminated as source of the problem.

c)Often we got alarm DC24V UPS For CAMS Abnormal meaning that we have either earth fault and this could be the problem giving sensors extra current input causing false readings.

Searched for earth fault by shutting down FPD6. DC24V UPS For CAMS still abnormal but intermittent.

d)For correct operation of the analogue sensors the AMS system need clean and steady 24V on them. By calculation(see below) we needed to get a decrease in voltage on the sensors so that they would display temperature increase and cause slowdown and shutdown.

Temperature= 100C



$R(\text{Sensor reads } 100\text{C})=100\text{ohm}$

$U(\text{Normal voltage})=24\text{V}$

$U_e(\text{Error voltage})=22\text{V}$

$$R = \frac{U}{I}$$

$$I = \frac{U}{R} = \frac{24}{100} = 0.24\text{A} = 24\text{mA}$$

$$I_e = \frac{U_e}{R} = \frac{22}{100} = 22\text{mA}$$

$R(\text{Sensor error})=U/I_e=24/0.22=109.1$
ohm that is an faulty increase in temperature

Device that is in common with all analogue cards is the DC/DC converter which acts as a voltage stabilizer and keeps the sensor voltage at exactly 24.0V.

Tested DC/DC converter by measuring voltage on it during alarm occurrence and it showed always 24.V exactly. Problem not solved.

e) During lighting check in E/R we found one indication lamp is not working on UPS power supply. Indication of Main power input was ON but the lamp was not lighting up. Amperage of the Main power was 0A. Replaced indication bulb 6V and the light still didn't light up. We measured lamps indication transformer that converts 440V input into 6V and it didn't have 440V input. Found two burnt fuses on R and S phases. Because of RS phases out of service the main rectifier was offline as so was the linear interference suppressor module. Replaced two burnt fuses(special) and interference suppressor started working, Main power rectifier engaged, amperage increased but the indication light did not go up. Upon testing of indication transformer we found it was in short circuit and so those two fuses burnt causing Main power failure. Interference suppressor did not work because of that. Charging rectifier(backup) does not have any filters for 24V so it was the source of harmonics and caused all those sensor faults.