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CTT/300/11/02/TECH

21 Oct 22

The Commander-in-Chief
{for CTO (Marine)}
Headquarters
Andaman & Nicobar Command
Port Blair – 744 102

CAUSATIVE ANALYSIS OF FAILURE ON RECTIFIER OF MCS 5 – INS CHETLAT


1. Refer to HQANC letter ANC/422/EG17/1 dated 23 Sep 22.
2. **Background.** INS Chetlat is fitted with two rectifiers of Make – EMF, with rated capacity – 415/24V and 100 Amps for providing 24V DC supply to MCS 5.
3. **Defect History.** MCS 5 system is fitted with two display panels, the master display unit has been non-ops for approx two years and only the slave display unit is operational onboard. Both rectifiers were replaced from existing (rated capacity – 230/24V and 100 Amps) to M/s EMF make rectifier during SR in Jun 21 (rated capacity – 415/24V and 100 Amps).
4. On 10 Sep 22 at about 0915h MCS 5 panel was switched on towards calibration of steering nozzle of port water jet by M/S Norinco. After initial booting up, the system shut down without any warning. The ship's staff carried out complete switch off and switch on of the system after one minute, however, the system was unable to boot up.
5. The defect was intimated to reps of M/s MTU, Port Blair and further DI/DR was carried out and it was found that the output voltage of the two rectifiers measured **31.8V** and **38.6V** respectively.
6. **Analysis.** A technical team from CTT (PB) was deputed towards undertaking causative analysis leading towards failure of rectifier for MCS 5.
7. **Observations.** Following observations prevalent: -
 - (a) Authority towards replacement of rectifier from 230V AC / 24V DC to 415V AC / 24V DC was not held onboard.
 - (b) Similar rectifiers are not available in other similar class of ships.
 - (c) Inadequate technical document held onboard.
 - (d) Status / condition of 24V external battery supply could not be established.

- (e) M/s Techmeet had already completed its DR as the same was offloaded by NSRY(PBR).
- (f) Email / telephonic conversation with M/s EMF, Kolkata indicates following:-
- (i) The primary step-down transformer is of 415/45 V rating and the same is reduced / regulated to 24V +/- 5% using the software embedded on the IC.
 - (ii) The unique auto / manual switch have been incorporated in this rectifier towards adjusting the output values bypassing the programmed ICs.
- (g) Telephonic conversation with M/s Techmeet indicates following:-
- (i) Based on its experience and understanding on the working of the system, reversed engineering of the software has been carried out.
 - (ii) The firm does not have the proprietary software of M/s EMF, Kolkata nor is the firm authorized rep of OEM.
 - (iii) Defect rectification on thyristor and potentiometer has been carried out.

8. **Probable Cause.** Post interaction with the crew and analysing the sequence leading to failure of the rectifier of MCS 5, the defect is likely due to one or more of the following reasons:-

- (a) Accidental setting of auto / manual switch to manual.
- (b) Unregulated flow of high current due to failure of potentiometer.
- (c) Corruption of embedded software.

9. **Recommendations.** In the absence of initial assessment report by NSRY(PBR), identification on the exact cause of failure is inconclusive. It is therefore recommended that the OEM M/s EMF, Kolkata be prevailed upon towards undertaking a complete assessment of the system and identifying the exact cause leading to failure of both rectifiers simultaneously.



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