

NOTES FROM SEA

BY

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These notes have been compiled from reports made to C-in-C Fleet over the period October 1983 to October 1984.

GENERATORS

During her delivery voyage to Hong Kong one of the Hong Kong Patrol Craft, H.M.S. *Plover*, reported a failure of her No. 3 generator and a resulting fire. The incident occurred as the ship was leaving Sardinia. No. 2 and No. 3 generators had been running in parallel with loiter drive engaged, when No. 2 generator shed its load and the resultant overload on No. 3 generator was reported to have been caused by failure of the overspeed trip and over-voltage trip to operate.

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The subsequent OPDEF stated that the No. 3 generator fuel pump linkage had vibrated off its shaft, allowing the engine to go to full fuel and overspeed condition with the resultant load increase. The associated frequency rise was confirmed by reports of radar aerials and the electric capstans speeding up to very excessive levels.

This report contained the apparent contradiction of an electrical overload occurring with an overspeed condition—contradictory because an overload will normally bring about a drop in speed. The mechanics of failure as reported therefore bore investigation and an on-site examination by C-in-C Fleet Electrical Staff included questioning those involved and tests carried out on the switchboard. The likely sequence of events leading to the generator failure and associated fire was concluded to be:

- (a) No. 2 and 3 generators on load, in parallel; loiter drive engaged.
- (b) Loiter drive power demand increase with consequent demand for power by pump motor and No. 3 generator fuel rack goes to full demand.
- (c) Connecting arm between governor and fuel pump vibrates off its splines leaving engine at full fuel setting. No safety spring is fitted to return the arm to the 'no fuel' position. All the engine trips (including overspeed) operate through this arm so they too become inoperative.
- (d) No. 3 generator, in speeding up, takes all the load as its frequency rises. No. 2 generator therefore sheds its load and starts to motor.
- (e) No. 2 reverse power relay correctly operates and No. 2 supply breaker opens. No. 3 generator is now overspeeding and also overloaded electrically.
- (f) No. 3 AVR saturates and some over-voltage is probable, but no over-voltage trip is fitted so the supply breaker stays closed.
- (g) In spite of the overload condition, the engine continues to speed up and the frequency continues to rise. This indicates an engine which is over-rated with respect to the generator rating.
- (h) The generator fails due to physical breakup under centrifugal force and the subsequent friction causes a fire.

Fires in generators are unusual incidents and two have been reported this year. The second, in a ROTHESAY Class ship, started on a diesel driven generator due to the failure of a temporarily repaired cooling water pipe. The water began to weep from the repair and entered a perished gland in the generator terminal casing. The generator shorted, caught fire, and required changing.

UPTAKE SPACES

Fires in machinery uptake spaces are sadly not so uncommon. No less than six instances were reported in the last year where the cause of the fire was attributable to the stowage of combustible materials. The following examples are quoted from ships' fire reports:

- 'Combustion of cleaning gear caused by the heat of the D/G exhaust'—02G compartment in a LEANDER foremast. This compartment has also been used as a flag stowage.
- 'Empty plastic lagging material container against hot waste steam pipe—Type 12.
- 'The main source of conflagration was ready-use stores and spares placed in the after diesel uptake space'—Type 42.
- 'Spontaneous combustion in unused preformed felt and paper filters stored in 03N upper funnel compartment between Tyne and Olympus

exhaust compartments'—Type 42. This fire was associated with a shut-down of the after engine room ventilation while both Tynes were running. The implications of this are still being investigated.

The common thread to these reports is the lack of appreciation that fires start without an explained source of ignition. The rules prohibiting the stowage of combustible materials in uptake spaces were written from experience. Abuse them at your peril.
