IMCA DP Station Keeping Event Bulletin 03/16

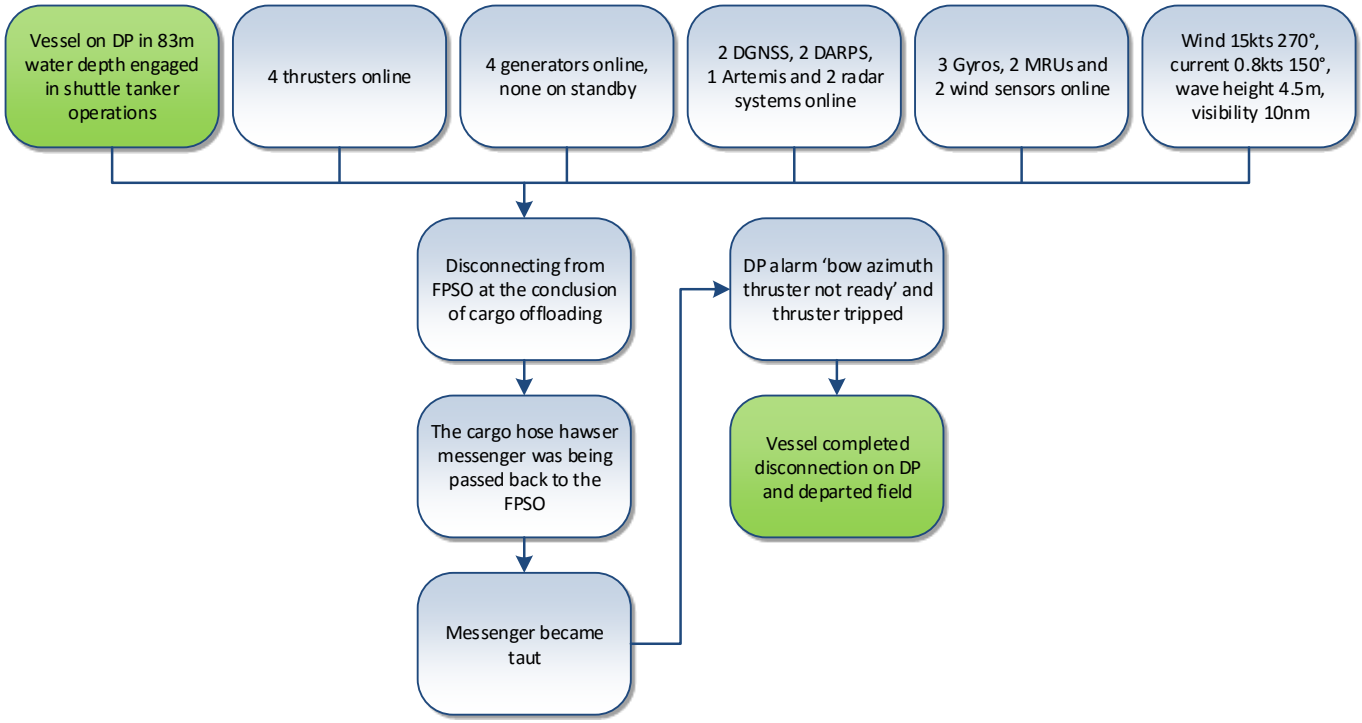
September 2016

The following event trees have been compiled from recent reports received by IMCA. The originators granted IMCA permission for the trees to be analysed and commented on by the IMCA DP Focused Workgroup. To ensure anonymity not all of the information contained in the original report was made available to the persons analysing these event trees.

Vessel managers, DP operators and DP technical crew should consider if these events and comments are relevant to their own vessel DP operation so that they can be used to assess and assist the safe operation of the vessel.

Any queries regarding this bulletin should be directed to IMCA Technical Adviser Andy Goldsmith (andy.goldsmith@imca-int.com). Members and non-members are welcome to contact Andy if they have experienced DP events which can be securely analysed and then shared anonymously with the DP industry.

Thruster Entanglement During Shuttle Tanker Operations – DP Undesired Event



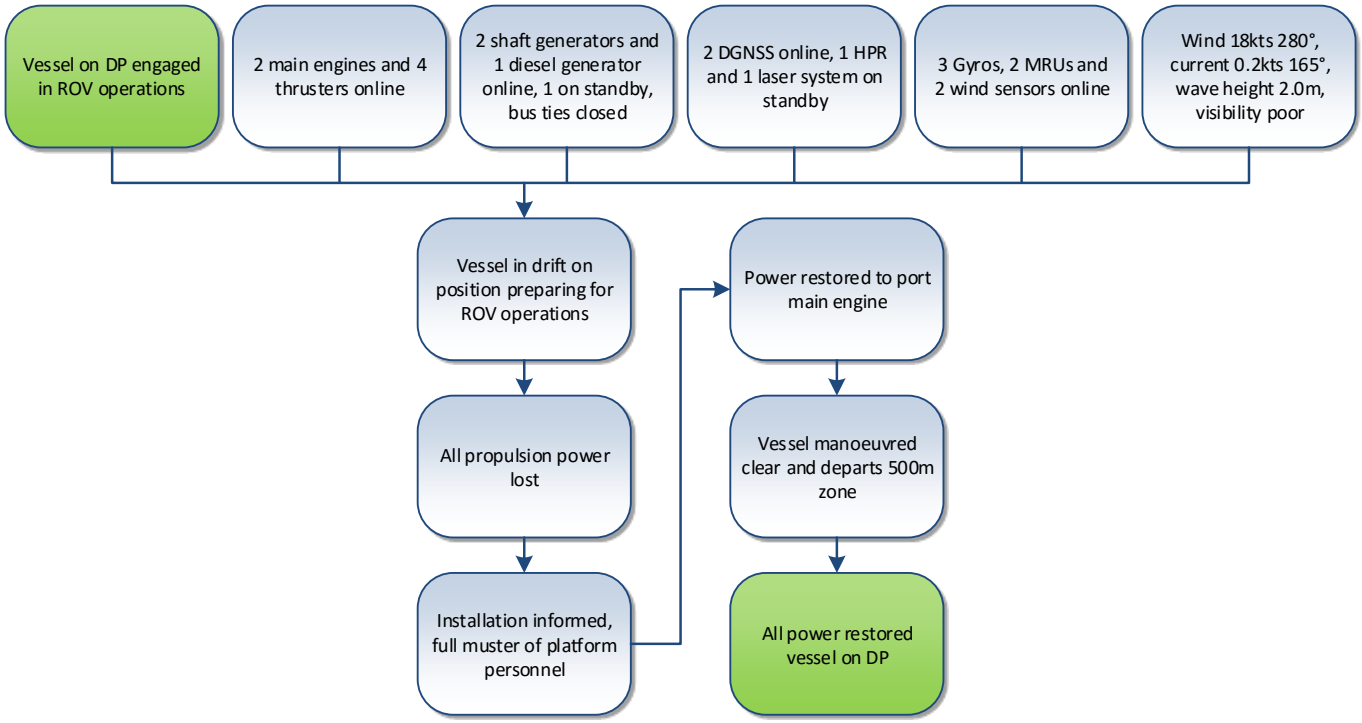
Comments:

Operations were conducted according to procedures. It was concluded that the procedures for this operation needed to be modified to limit the amount of rope in the water to prevent bow thruster entanglement.

Considerations from the above event:

- Operations were being conducted within limits that allowed for disconnection to be completed in a controlled manner using the redundancy of thrusters.
- All vessel types are reminded to review procedures that might affect DP operations, particularly those covering downlines, hoses, ropes, etc.

Incorrect Wiring Causes Loss of all Propulsion – DP Incident



Comments:

Subsequent investigation identified the following:

- **What went wrong?** Through extensive evaluation by numerous technicians, the main cause of the incident was found to be the improper wiring of the main and backup power supplies. Three engines were electrically connected through the DC40 main power supply. This enabled an erroneous shut down signal to be sent to three engines simultaneously.
- **What were the causes of the incident?** There was a fault in the wiring configuration of the vessel's main engine 24VDC supply. The wiring for the main power supply and the backup power supply was reversed which tied the two main engines to the same main power supply, thereby reducing vessel redundancy. Furthermore, a ground fault was identified on the main 24V supply to the main engines. Subsequent testing revealed the diesel control units (DCU) responded differently when subjected to grounding tests; the port main engine would continue running while the starboard main engine would shut down.
- **What lessons were learnt?** This misconfiguration, and subsequent loss of DP redundancy, was unknown to the crew. The wiring of the vessel's main engine 24VDC supply had been completed prior to the current management company assuming management of the vessel. This incident further stresses the importance of a maintenance programme and complete maintenance records.

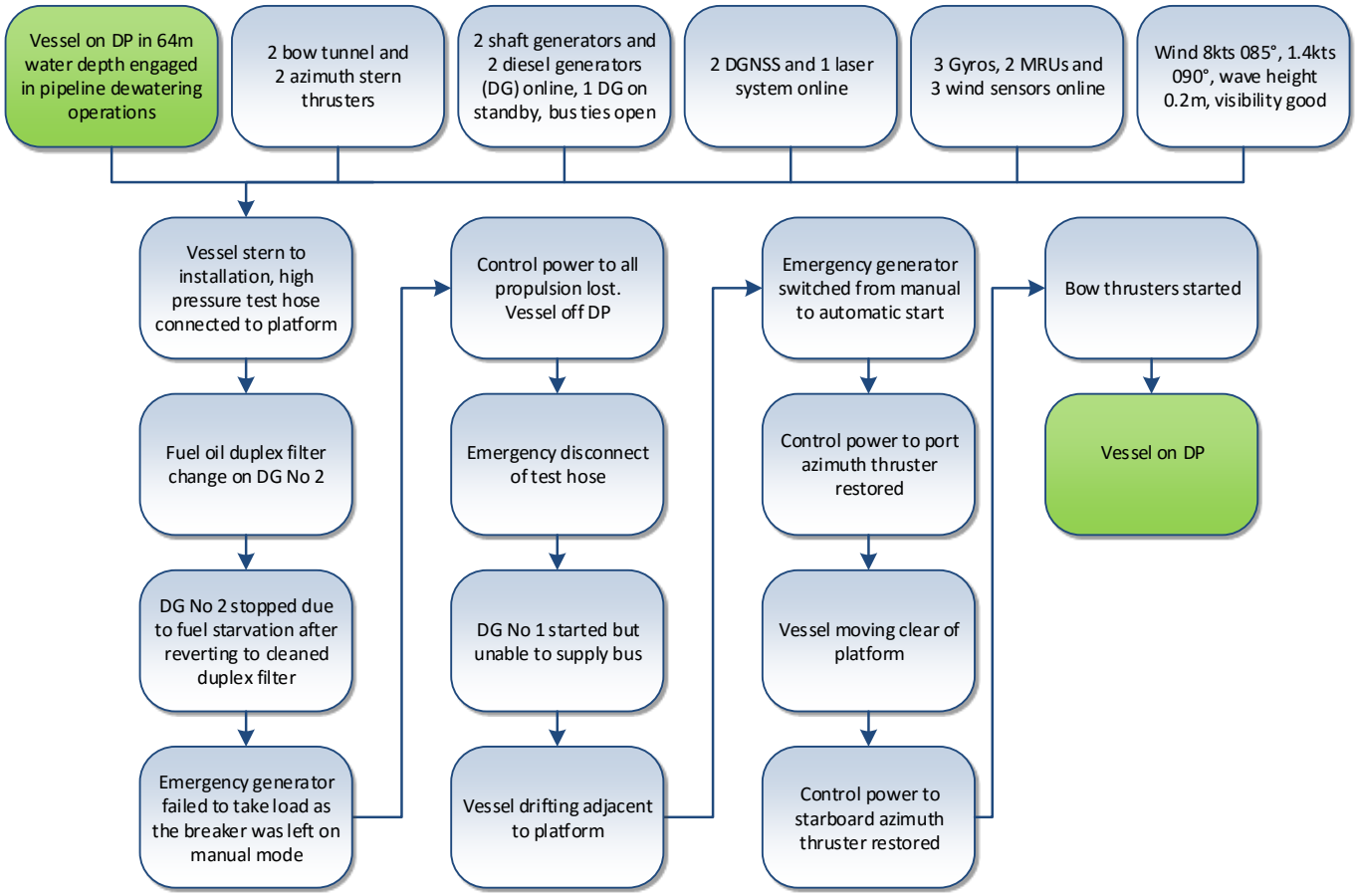
Actions:

Several changes were made to the vessel's systems such as the replacement of the governor, DC40 battery supply and the starboard DCU and all was tested to satisfaction. To ensure the matter has been completely rectified, the vessel was subjected to a full five-year FMEA.

Considerations from the above event:

- This incident stresses the importance for a good initial FMEA, the tracking of modifications and ensuring documentation is up to date, plus the importance of proving redundancy groups on a frequent basis.

Fuel Oil Filter Change Leads to Generator Failure – DP Incident



Comments:

During routine rounds the engine room watchkeeper decided to replace the left filter of the duplex fuel oil filter of DG No 2. This generator was part of the port redundant system and supplied power to the 415v and 220v bus A and emergency switchboards. DG No 2 suffered a blackout due to FO starvation after the filter was changed and as a consequence of incorrect operation of the duplex fuel filter. DG No 1, which is also part of the port redundant group, was started, however it was unable to supply power to the bus. The emergency generator did not connect to the bus bar as the breaker was left in manual mode therefore losing power to bus A and the emergency bus bar. At this juncture batteries should take the load for control power of DP essential equipment, however the batteries were drained.

The failure of the port redundant group should not have resulted in the loss of all propulsion control power as there was no failure on the starboard redundant group. However, this was not the case because there was a design fault such that the 220v AC and 24v DC systems providing control power for all propulsion was from the port redundant group only.

The vessel is five years old and this design fault was not captured in the FMEA or annual DP trials. The last annual DP trials was conducted less than three weeks prior to the incident.

The principle corrective actions initiated were:

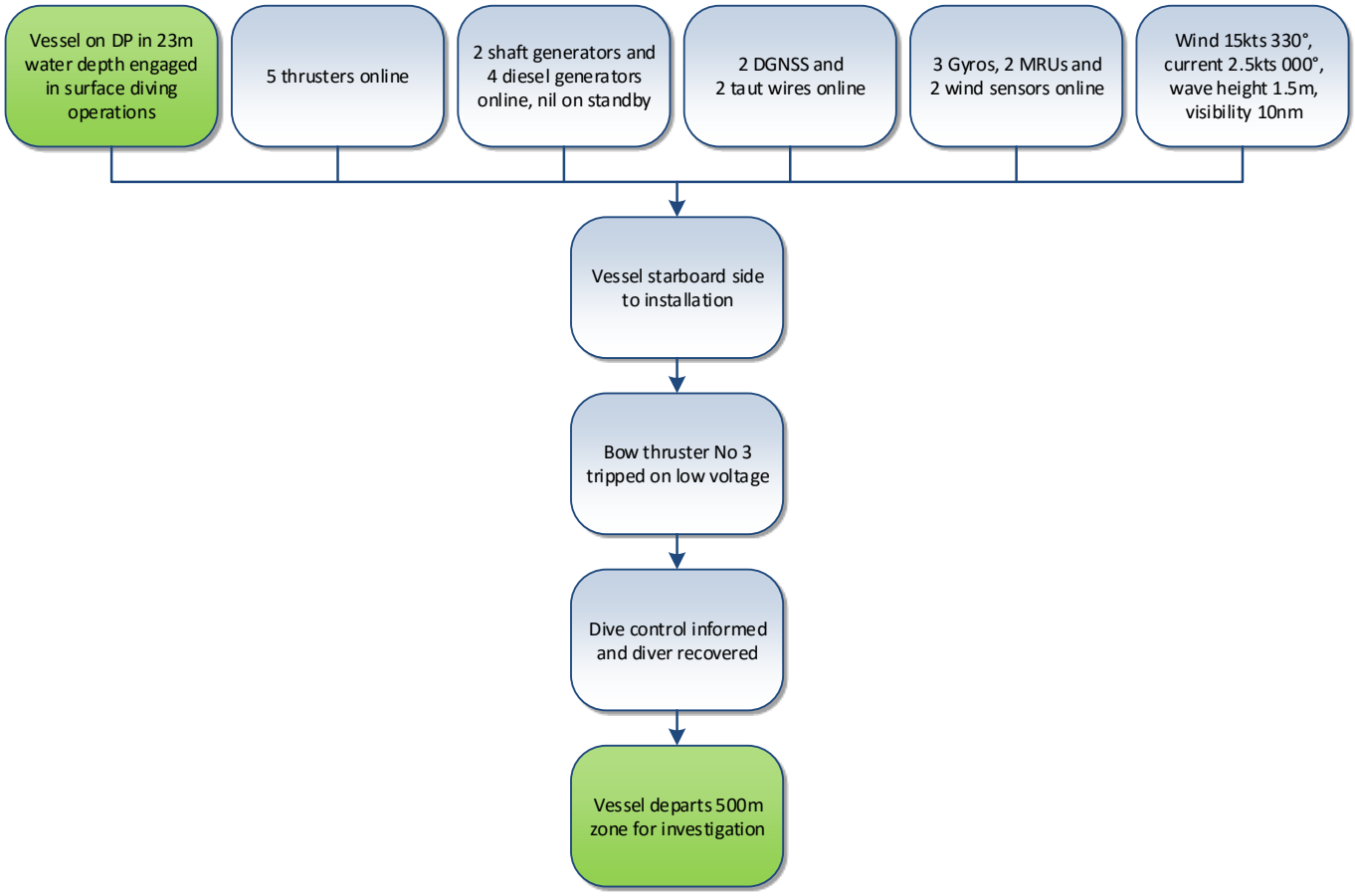
- No maintenance to be undertaken on any active or passive DP component whilst working within the 500m zone of an installation.
- Switchboard setup was permanently modified so that propulsion control power was supplied from different redundant groups.
- Switchboard setup to be verified by two separate watchkeepers.
- Regular DP blackout drills to be instigated.

- Regular switchboard setup training to be conducted.
- Battery checks and testing routines improved.
- Company test and trials programmes reviewed and updated.

Considerations from the above event:

- This incident again stresses the need for a good initial FMEA, tracking of modifications and ensuring documentation is up to date, plus the importance of proving redundancy groups on a frequent basis.
- Vessels must operate a robust permit to work system.
- The importance of using correct and concise DP checklists for both engine room and bridge.

Bow Thruster Tripped Due to Lack of Power – DP Observation



Comments:

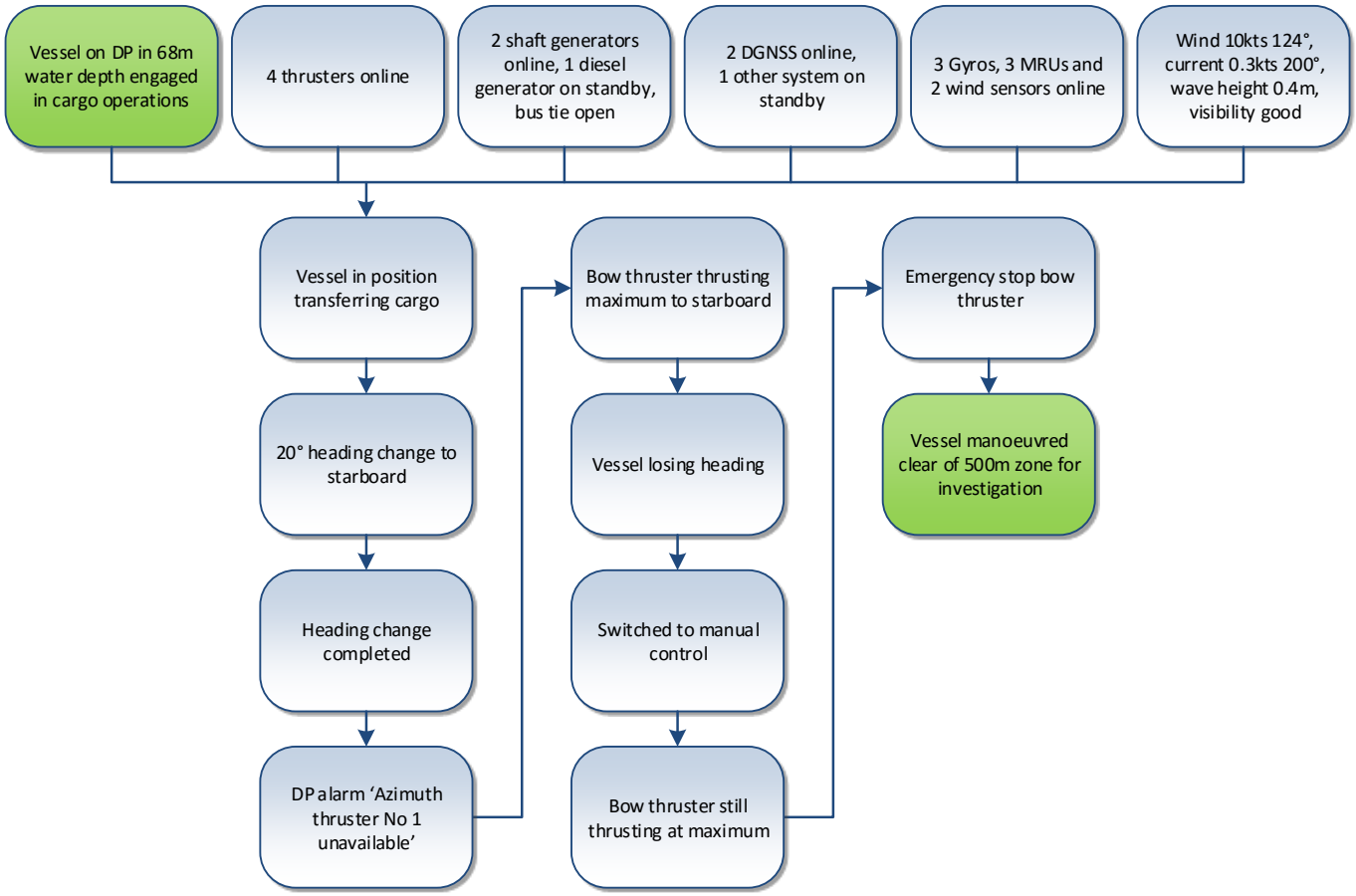
The seat for the stop solenoid on the port main engine was damaged causing a slight air leak past it, this acting on the stop cylinder piston caused a reduction in main engine rpm. The reduction in rpm caused a low voltage alarm followed by breaker trip and low frequency alarm. Power was lost to bow thruster No 3 due to a breaker trip on the switchboard, the port azimuth thruster was not affected as the clutch out rpm was not reached.

The vessel has reduced the inspection interval of the stop solenoid valves from annual to six months.

Considerations from the above event:

- The vessel did not appear to reach its worst case failure (WCF) and although DP redundancy was effective precautionary measures were initiated.

Separate Problem with Two Thrusters Caused Loss of DP – DP incident



Comments:

The bow thruster gave an alarm that pitch was at maximum showing 114% on DP display. Investigation concluded that the full starboard maximum limit command/set point of the bow thruster proportional valve had been adjusted to 70%. During maximum pitch request the valve had to be permanently opened with constant and continuous hydraulic oil flow through the proportional valve. It was concluded that because the valve direction flow was set at 70% this resulted in the valve's malfunction and pitch stuck at maximum. It was later discovered that the azimuth thruster tripped because of sea water contamination of the gear box oil.

Considerations from the above event:

- Consideration should always be given to making heading changes in incremental steps, a heading change of 20° in one step during critical operations is not recommended.
- To stop adverse thrust from a rogue thruster it must be shut down and not just deselected from DP control.