IMCA DP Station Keeping Event Bulletin 04/17

October 2017

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 Marine DP Committee. 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.

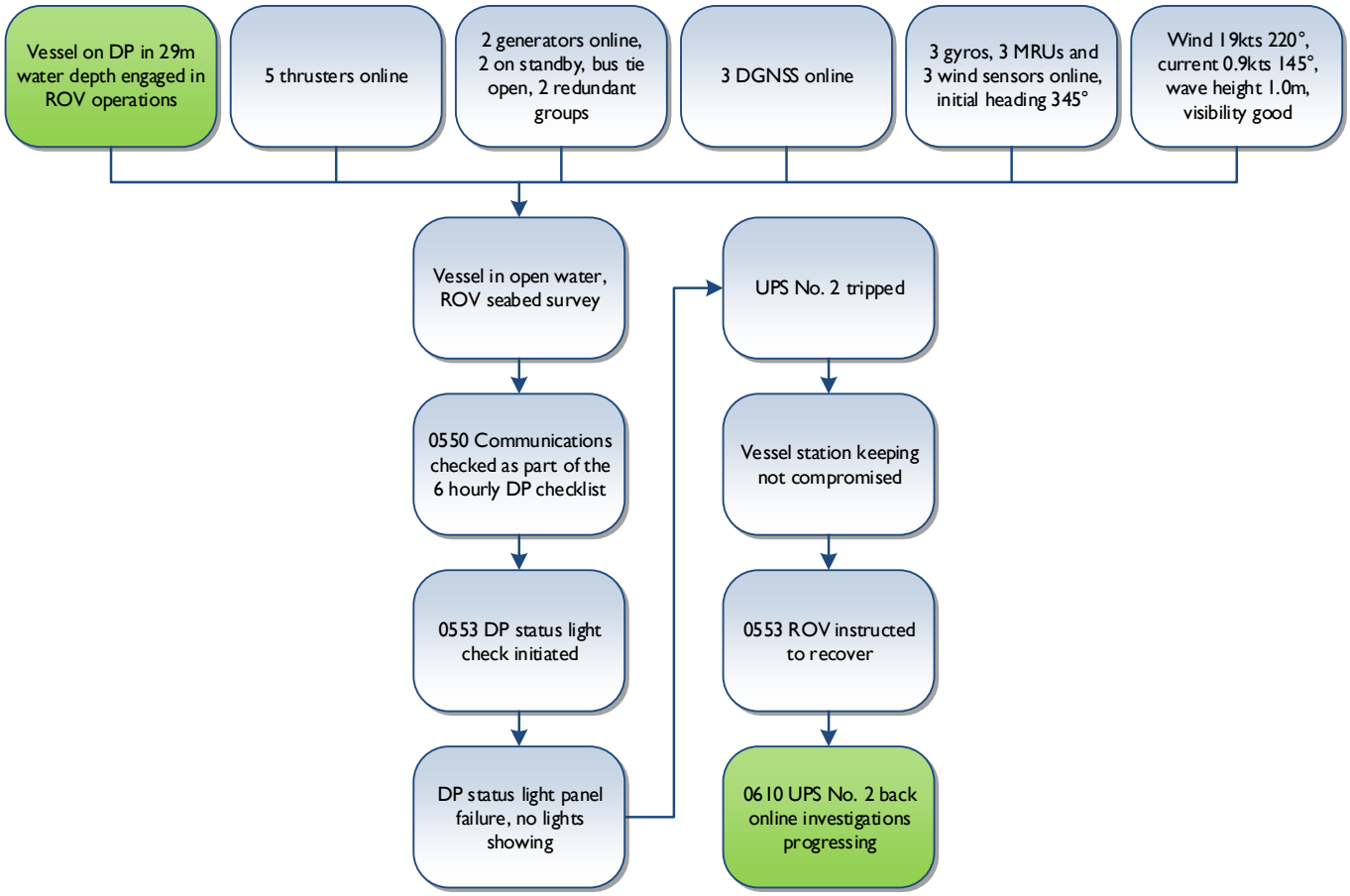
The IMCA Marine DP Committee has prepared four DP station keeping event bulletins during 2017. It is evident that many of the reports submitted to IMCA have shown a considerable reliance being placed on DGNSS as a position reference system. This over-reliance on one system has, on occasions, led to vessels being left without a working position reference system. These systems are proven to be reliable and convenient methods for position reference. However, the committee would like to highlight the requirement of the International Maritime Organization (IMO) circulars covering guidelines for vessels and units with DP systems IMO MSC/Circ.645 and the recently published IMO MSC.1/Circ.1580 as follows:

> *When two or more position reference systems are required, they should not all be of the same type, but based on different principles and suitable for the operating conditions.*

Another important consideration is the use of decision support tools which are not always evidenced in the DP station keeping event reports received. Location specific conditions are always to be considered when planning for an operation. Section 4 of IMO MSC.1/Circ.1580 covers DP operations and applies to all DP vessels irrespective of their build date. Sub section 4.1 states the following:

> *Before every DP operation, the DP system should be checked according to applicable vessel specific location checklist(s) and other decision support tools such as Activity-Specific Operating Guidelines (ASOG) to make sure that the DP system is functioning correctly and that the system has been set up for the appropriate mode of operation.*

Temporary Connection to DP System Caused Short Circuit – DP Undesired Event



Comments:

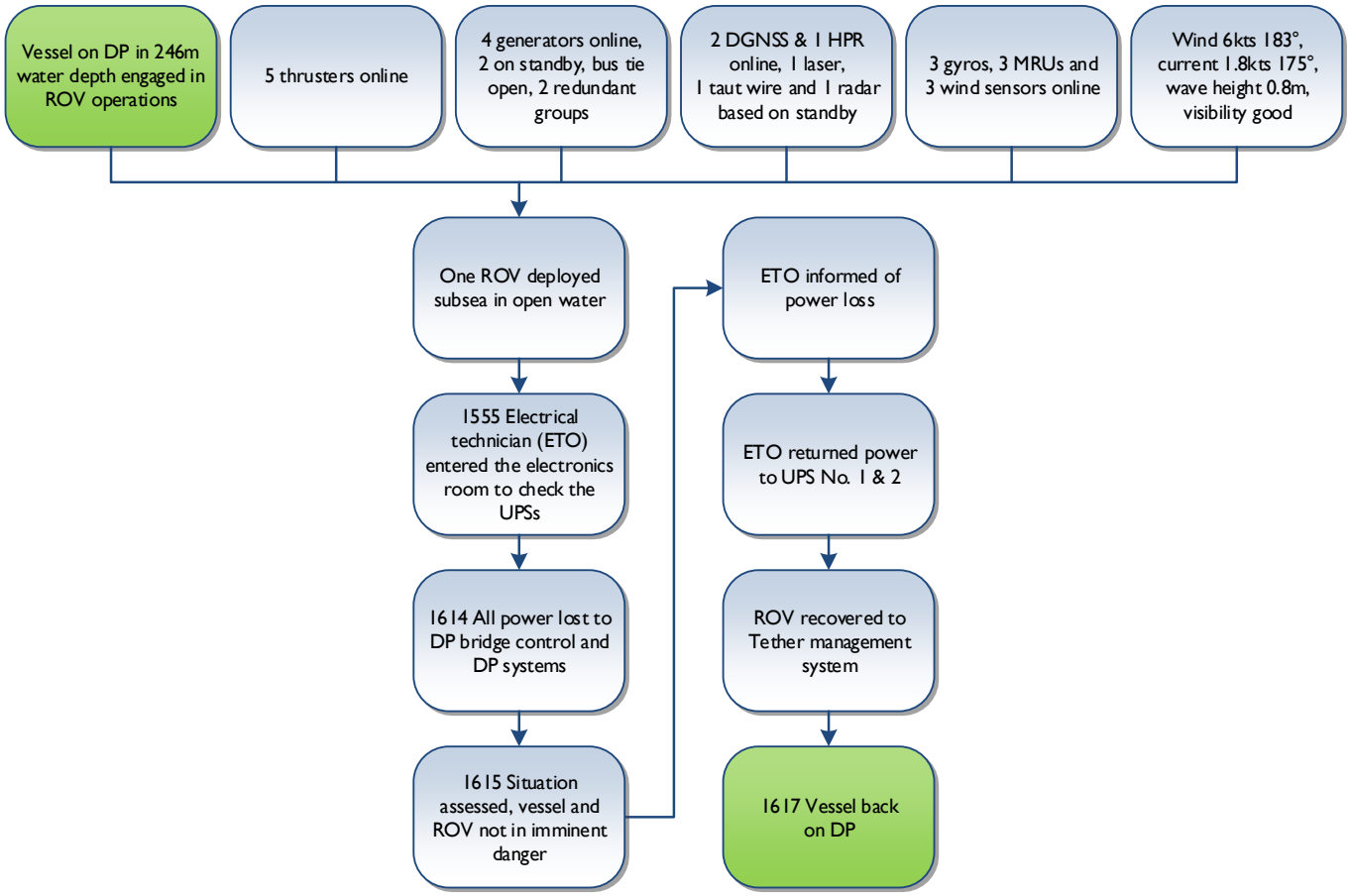
Various DP equipment, including the DP status lights, were connected via UPS No. 2. Investigation found that the UPS tripped because of a break in the portable cable supplying the DP status lights to ROV control.

- The vessel does not have a permanent ROV system, when an ROV system is mobilised it is a requirement that the ROV control has DP status lights. This is achieved by installing a portable set of lights that are connected to the vessel's DP system by a cable.
- The same cable had been in use for several years whenever an ROV system was mobilised.
- Inspection procedures have been modified to include portable wiring and a bend preventer/limiter used for future connections.

Considerations from the above event:

- Connection of ANY temporary system to a DP system should be as part of a formal management of change and properly risk assessed.
- The connection of ANY temporary system should be designed to tolerate a short circuit or any other failure.
- Additional systems that are connected to a DP system should be approved by manufacturer and class and should be extensively tested.
- The vessel is recorded as operating within DP equipment class 2, however only satellite derived position reference systems were recorded as being in use.

Check of the UPS led to Loss of Power – DP Incident



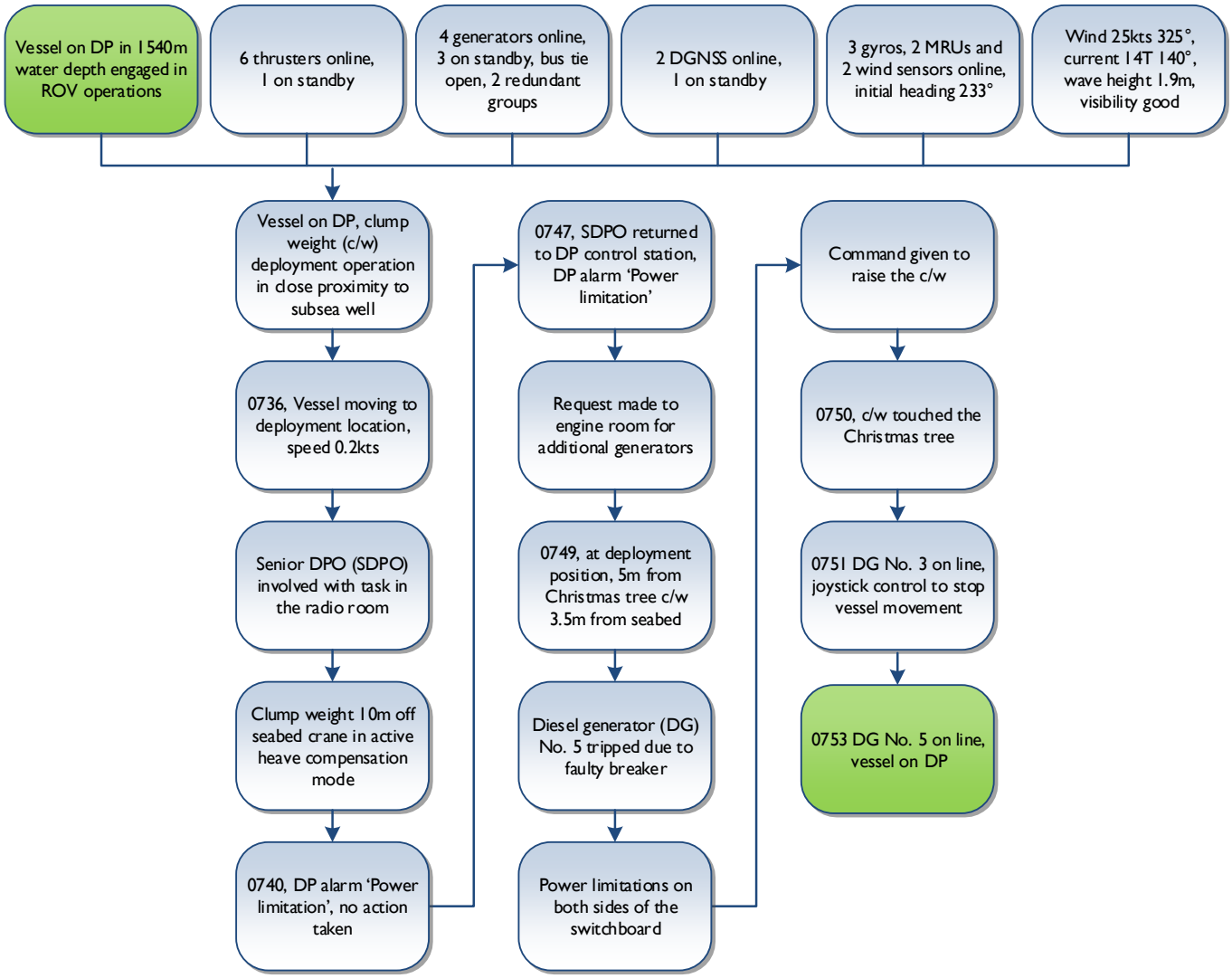
Comments:

At approximately 1555 the ETO came to the bridge and asked the Senior DPO permission to enter the electronics room to check the UPS batteries. The SDPO gave permission, not knowing the detailed work scope of the ETO.

Considerations from the above event:

- Both planned and unplanned work on DP equipment should be subject to a permit to work system.
- Maintenance routines need to be carefully managed during DP operations and planned maintenance of any DP equipment should be avoided whilst the vessel is operating on DP.

Lack of Planning and Situational Awareness Causes – DP Incident



Comments:

The event was investigated by the vessel operator, findings are summarised here:

Human factors:

- The DPO was left alone at the DP console during critical subsea operations. In such critical subsea operations, subsea lifting in vicinity of Christmas tree, both DPOs should have been 100% focused on current operations.
- Following the power limitation alarms, the DPO didn't inform the SDPO, or request to start additional generators. Despite having wind and current pushing the vessel in the direction of the Christmas tree, he didn't realize that the situation was becoming critical.

Processes and procedures:

- The activity specific operating guidelines (ASOG) was built up considering only vessel operations criticality and location (inside or outside the 500m zone), it failed to take into consideration the power consumption of ROV and cranes during these operations.
- The ASOG required only 2 DG on each bus bar. That means that YELLOW status (load >50%) would be reached earlier than with 3 DG per bus bar. The DPO and engineer on watch didn't respect the ASOG as they didn't react when YELLOW status was reached.

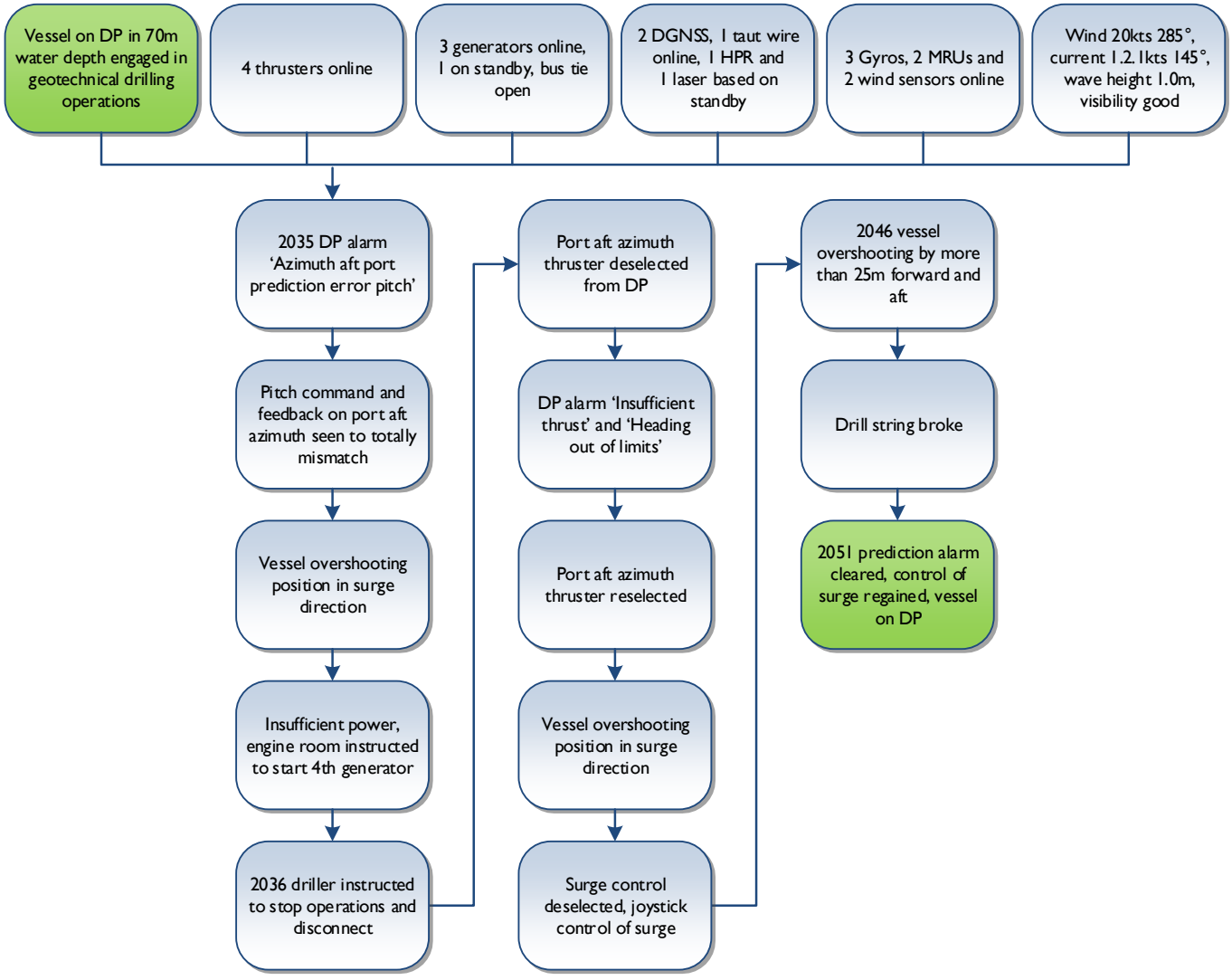
Equipment and design:

- The purpose of a micrologic breaker is to protect the electrical circuit from damage caused by excess current. In this situation, the breaker interrupted current due to misreading of the amperage. Preventive maintenance routines had been followed and increasing maintenance frequency would not prevent the kind of failure that affected DG No. 5.

Considerations from the above event:

- The power limitation alarm was active for 11 minutes, the power management system did not instigate an automatic start, therefore the FMEA and DP trials should be questioned.
- Neither the DPO nor engineer reacted to the situation and one DPO was left alone at the DP control station during a critical phase.
- Lack of preplanning and development of a separate ASOG for the task directly contributed to the event.
- The vessel is recorded as operating within DP equipment class 2, however only satellite derived position reference systems were recorded as being in use.

Thruster Command and Feedback Differences Leads to – DP Incident



Investigation comments:

The DP system reported a thruster pitch prediction error when a large difference between the command and feedback was detected at 20:35:34. The description for a thruster prediction alarm states that the operator must take action to determine if the alarm is caused by a faulty feedback signal (DP performance nearly unaffected) or a faulty command signal (DP performance affected).

The port azimuth thruster was not stopped and only momentarily deselected from DP. The thruster gave thrust in the wrong direction while it was running and the DP system was unable to maintain position.

The prediction alarm went to normal again at 20:51:04 and the DP system was able to maintain position. No problems were reported after this.

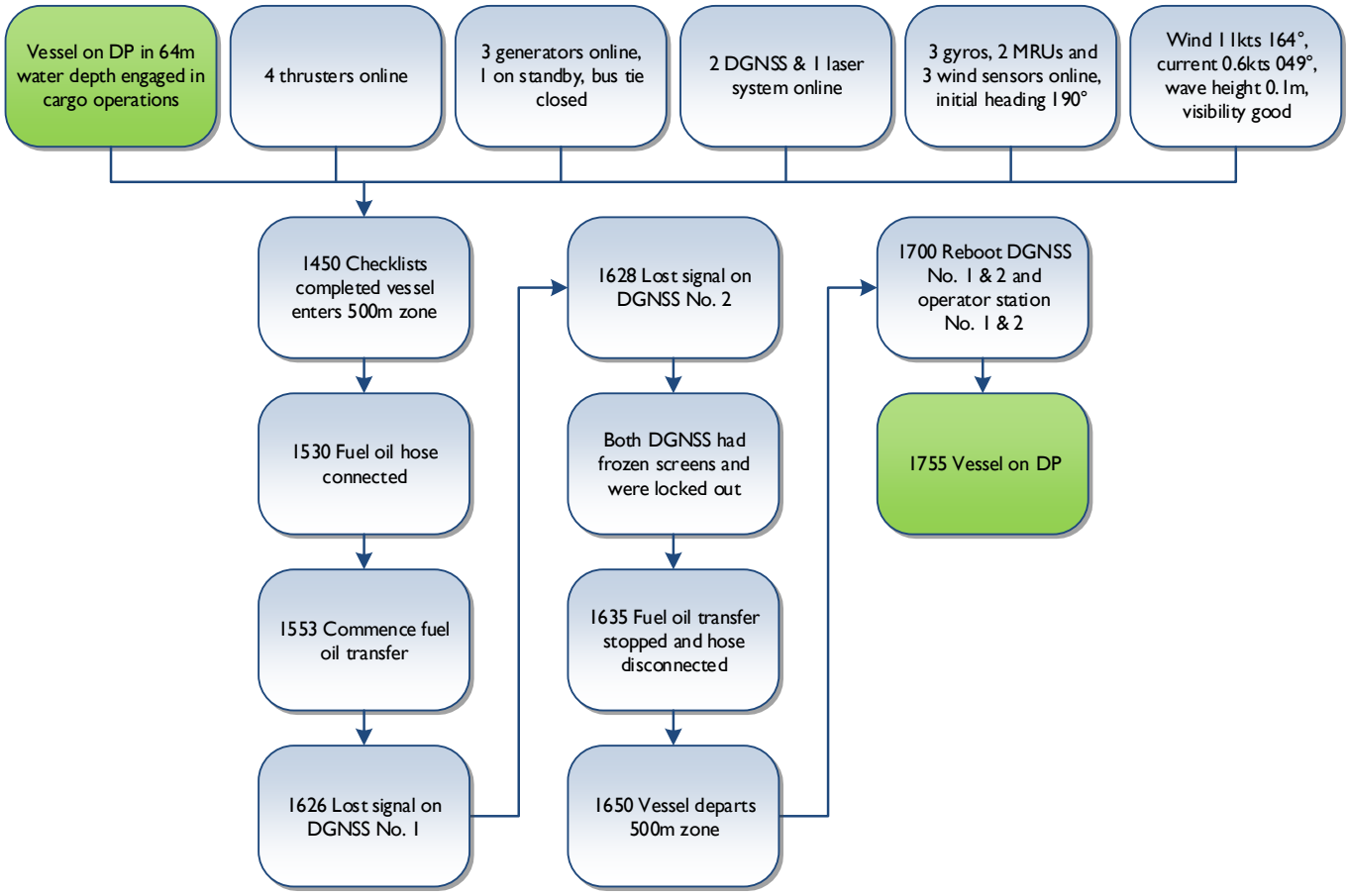
Since the command output from the DP control system was correct, it was concluded that the fault had to be in the output control loop. It was decided to replace items in the command loop with spare parts held on board.

Trials and DP tests were carried out to verify system after replacement of parts. No problems or findings to report.

Considerations from the above event:

- The reason for reselecting the errant thruster must be questioned.
- In this situation stopping the errant thruster should have allowed the DP system to regain control.
- Event box No. 2 (pitch command and feedback mismatch indication) provides the trigger to stop the thruster because it indicates there is a problem with thruster commands.

Common Mode Failure of DGNSS – DP Undesired Event



Comments:

Both DGNSS systems had locked up, the touch screen was not responding and the NMEA signal was no longer being received, the DP system alarm displayed 'Telegram timeout'. The GNSS manufacturer concluded that with both systems suffering issues at the exact same time it pointed towards a common factor, the likely root cause was signal interference.

Recommendations included:

1. Ensure the antenna, cables and connectors are in a good condition and no damage to them.
2. Tune the MF module on each set to different MF stations.
3. Check if both systems are utilising the same Precise Point Positioning service; if so, consider changing one of them.
4. Copy the configuration files for reference.
5. If a further crash occurs take pictures of the system screens as there may be additional windows error messages.

Considerations from the above event:

- The DP system worked as designed, the vessel departed the 500m zone, for investigation, on DP using the laser system as reference.
- The root cause of the problem was not found however it was believed to be a common mode failure.
- Most DGNSS suppliers have a function available to check for shadow of satellites, users would be wise to make proper use of this tool.
- Improvement measure would be to use two different DGNSS suppliers and different differential position services.