Report No 146

Navigation Act 1912
Navigation (Marine Casualty) Regulations
investigation into the near collision
involving the loaded Greek flag tanker
Olympic Symphony
and an anchored vessel in Moreton Bay,
off Brisbane, Queensland
on 28 April 1999

Issued by the

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Inspector of Marine Accidents
Marine Incident Investigation Unit
Australian Transport Safety Bureau
PO Box 967
Civic Square 2608 ACT

Phone: 02 6274 6088
Fax: 02 6274 6699
Email: maritime@atsb.gov.au

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Olympic Symphony

Summary

On the morning of 28 April 1999, the Greek tanker *Olympic Symphony*, loaded with crude oil, was inbound to the BP wharf at Luggage Point in the Brisbane River. A pilot was conducting the navigation and the master and 2nd mate were on the bridge. The vessel was on hand steering and, after clearing East Channel, was steadied on a course of 245°. At about 0755, the vessel approached the Entrance Channel and the pilot ordered port rudder.

Olympic Symphony was steadied briefly on a course of 230° when the helmsman noticed that the rudder angle indicator did not indicate any rudder movement to port. At about 0757, the helmsman reported that the vessel was not responding to the helm and that the steering was stuck to starboard.

The pilot ordered the helm hard over each way but there seemed to be no response. He noticed from the rudder angle indicator that the rudder was at 5° to starboard. He ordered the speed reduced and asked the master for emergency steering. The master told the chief engineer to check the steering.

The pilot intended passing ahead of an anchored ship but *Olympic Symphony* continued to swing to starboard. He realised that they would have to pass astern of the anchored vessel, which was now less than 3 cables off. He ordered the wheel put hard to starboard. The rudder angle indicator went to starboard and he ordered full ahead on the engine. By this time, the stern of the anchored vessel was almost ahead, probably less than a cable* from the bow of *Olympic Symphony*.

Olympic Symphony passed astern of the anchored vessel, clearing it by about 6-10 m.

The pilot informed port control (Brisbane Harbour) of the steering failure, stating that the vessel was likely to anchor. However, subsequent tests of the steering system showed that it was operating satisfactorily. The master told the pilot that the chief engineer had found no problem with the steering.

The pilot then notified port control that the vessel was operational and that it would be at the entrance beacons in about 12 minutes. The vessel resumed passage to the berth without further incident and, at 1014, was secured alongside.

* 1 Cable = 0.1 nautical miles = 185.2 m

Sources of information

The master, officers and helmsman of *Olympic Symphony*

The pilot

The master of *Proliv Sannikova*

Brisbane Harbour (‘port control’)

Brisbane Marine Pilots

TOKIMEC INC.

Novamarine Instruments Pty Ltd

Acknowledgement

Portion of chart Aus 236 reproduced by permission of the Hydrographic Office, RAN.

Australian Maritime Safety Authority (AMSA) incident report, reproduced with permission of AMSA.

FIGURE 2
Olympic Symphony* and *Proliv Sannikova

Olympic Symphony approaching *Proliv Sannikova*

Olympic Symphony clear of *Proliv Sannikova*

Olympic Symphony in shallows

Narrative

Olympic Symphony

Olympic Symphony is a Greek flag tanker of 96 672 tonnes deadweight at a summer draught of 14.027 m. The ship was built in 1990 by Sumitomo Heavy Industries Ltd., at the Oppama Shipyard, Yokosuka, Japan. It is owned by Clevedon Transportation Company, Liberia and is operated by Olympic Agencies (UK) Ltd.

It is a single hull tanker of 232 m in length overall, has a moulded breadth of 42 m, a moulded depth of 20.3 m and is powered by a 6-cylinder Sulzer diesel engine developing 14 200 kW.

At sea, the bridge is manned in the traditional four-on/eight-off watchkeeping system. When the vessel approaches port to load or discharge cargo, the mate works on deck to prepare for cargo operations, while bridge watchkeeping duties are shared by two 2nd mates. The engine room is an unmanned machinery space (UMS), with engineers working during the day and a duty engineer on call at night. The ship's control room is manned during manoeuvring operations.

The ship's complement of 26 is made up of the master and three watchkeeping mates, a chief engineer and three engineer officers, four junior engineers and a cadet, a bosun, pumpman, deck, engine and catering crew.

The master joined *Olympic Symphony* as master under training in September 1998. He took command of the vessel on 11 November 1998.

The incident

Olympic Symphony was bound for the BP wharf at Luggage Point in the Brisbane River. The vessel had a cargo of 78 313 tonnes of crude oil from Ras al Khafji in the Arabian Gulf and the draught was 12.2 m, even keel.

The pilot embarked off Point Cartwright at 0410 on 28 April 1999 and *Olympic Symphony* proceeded in for the bay passage at about 12 knots.

The pilot joined the Brisbane pilot service in 1993 after a career at sea and some pilotage experience in far north Queensland. He holds an open class licence for the port of Brisbane, permitting him to pilot any vessel into the port.

The master was on the bridge for the entire pilotage passage. A 2nd mate was on watch on the bridge, monitoring the vessel's position. The vessel was on manual steering during the passage to the berth and there were two steering pumps operating.

The mate had been on deck from about 0400, carrying out pre-arrival checks and planning the discharge of the cargo. He was also available to stand by on the forecastle in the event that an anchor was required. When the mate was not required on the forecastle he resumed work preparing for the discharge of cargo.

Shortly after boarding, the pilot and master discussed the passage plan and manoeuvring characteristics of the vessel. The pilot checked the ship's chart to make sure that the courses were correctly laid off for the passage and, at 0438, the engine was put to navigation 'full ahead' speed. The visibility was excellent and the sea was calm.

The passage inward was at full sea speed to Moreton Bay. The pilot's passage plan provided that at the entrance beacons the vessel was to be at manoeuvring speed. The plan also indicated that the anchors were to be clear and that, at the entrance beacons, the forecastle was to be manned. The tugs to aid in the berthing would be taken at the inner end of the Bar Reach.

The vessel cleared East Channel at 0721 on a course of 245° for the next waypoint northeast of the entrance beacons. The pilot advised the master and port control that the vessel would be at the entrance beacons at 0800. He then gave the master 10 minutes notice for manoeuvring of the main engine.

The speed was brought back to manoeuvring revolutions and the pilot started a turn to bring *Olympic Symphony* onto the leading marks for the Entrance Channel. He was intending to bring the vessel to port onto a heading of about 212°, in staged alterations of about 10°.

There were three ships anchored north of the Entrance Beacons. Closest to the beacons was the Ukrainian flag refrigerated cargo fish carrier *Proliv Sannikova*. This vessel had earlier lost its rudder and had been towed in from Suva. The next vessel was the *Laconikos II,* and the vessel furthest from the beacons was *Columbus Queensland*.

The pilot was using portable Differential Global Positioning System (DGPS) to aid in the conning of *Olympic Symphony*. Everything appeared normal as he altered course to 230° to bring the vessel towards the leads. Just after this, at about 0757, the helmsman noticed that, when he attempted to put the wheel over to port, the rudder angle indicator failed to follow the movement of the wheel. The rudder angle indicator was at a few degrees to starboard, remaining there even when the helmsman put the wheel further to port.

The helmsman reported that the rudder was not moving and the pilot ordered the helm hard over each way. He recalled watching the helmsman put the wheel over. He also watched the rudder angle indicator but nothing happened. The rudder angle indicator showed that the rudder seemed stuck at 5° to starboard.

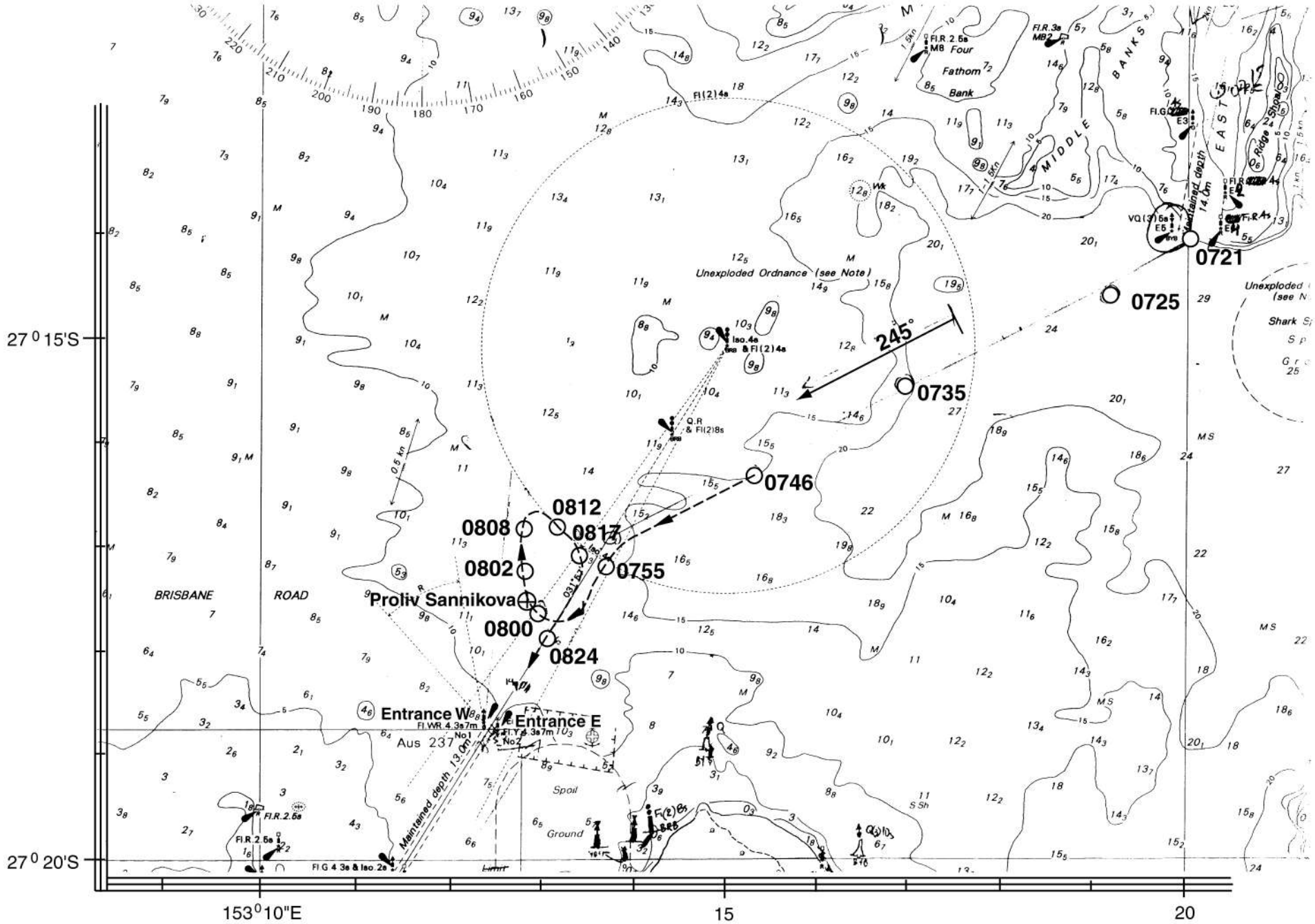
The master was to starboard of the steering console. He leaned over and turned the wheel to starboard, unseen by the pilot. The rudder angle indicator followed this movement of the wheel. The master then turned the wheel to port but the rudder angle indicator went back to 5° to starboard and stuck there.

The pilot was not aware that the master had checked the steering or that there had been a response when the helm had been operated to starboard. However, he had no doubt that the rudder was to starboard because the vessel started to swing to starboard. He immediately ordered the engine put to dead slow ahead and stop at 0758 ˚. He also asked the master if emergency steering could be used.

The master telephoned the chief engineer to tell him that there was a problem with the steering and asked him to investigate it. The chief engineer was in the engine control room and immediately went to the steering flat to check the steering.

Meanwhile the vessel continued swinging to starboard. The gyro repeater on the radar clicked faster, indicating to the pilot that the rate of turn to starboard was increasing. By this time *Olympic Symphony* had crossed to the west of the line of the leads marking the centre of the channel.

FIGURE 3
Portion of chart Aus 236 showing track of *Olympic Symphony*



The pilot asked the 2nd mate for a distance off the ship anchored on the starboard side, the *Proliv Sannikova*. The 2nd mate reported that this vessel was 4.3 cables away. The mate was on the forecastle when the master told him that the steering had failed and that he should stand by to let go the anchors. The pilot asked if the anchors were ready and the 2nd mate confirmed that both anchors were ready for letting go.

At this time the pilot estimated that *Olympic Symphony's* speed was about 9 knots as it swung to starboard towards *Proliv Sannikova.* He was aware that the vessel had minimal underkeel clearance as it entered an area of shallower water.

Initially, the pilot thought that *Olympic Symphony* could cross ahead of *Proliv Sannikova* but the rate of turn to starboard accelerated. Although the bearing of the anchored vessel was changing, the two vessels were so close that this was not an indication that they would pass clear. *Proliv Sannikova* was about 1˚ points on the starboard bow of *Olympic Symphony* and the angle was decreasing as the distance between the two vessels continued closing rapidly. The pilot realised that with the present speed, by using both anchors, he would not be able to check the tanker's progress, even if the engine was put astern. By now the anchored vessel was only about 3 cables distant.

Olympic Symphony continued swinging to starboard, so the pilot ordered the wheel put hard over to starboard. The wheel was put over and the rudder angle indicator followed. The pilot immediately told the master 'Full ahead'. The master put the telegraph to full ahead at 0800. By this time the stern of *Proliv Sannikova* was either right ahead or about a point to starboard.

The chief engineer was, by now, in the steering flat, where he found that the steering was operating to starboard at the time. He called the bridge to notify the master that the steering was working.

Olympic Symphony responded to full starboard helm and full ahead on the engine. The pilot realised that its bow would clear the other vessel but, with *Olympic Symphony* swinging to starboard, there was still the possibility that the sterns of both vessels would make contact.

As soon as the bow of *Olympic Symphony* was in line with the stern of the *Proliv Sannikova*, the pilot ordered the wheel amidships. He watched the rudder angle indicator, intending to put the wheel over to port to counteract the starboard swing and prevent contact, stern to stern. The rudder angle indicator came back and again stuck at 5° to starboard. They were still closing on the other vessel and there was nothing more that he could do to change the angle of approach. Someone on the bridge of *Olympic Symphony* said that they would clear *Proliv Sannikova*, but the pilot was not so confident.

The mate, on the forecastle head at the time, when asked by the master if they would clear the other vessel, confirmed that they would.

Olympic Symphony passed clear of *Proliv Sannikova*, at a distance estimated to be between 6 m and 10 m, though the mate estimated that the distance was nearer 6-7 m. After the two vessels had passed clear, the mate stayed on the forecastle until *Olympic Symphony* was berthed.

After clearing *Proliv Sannikova,* the pilot maintained the swing to starboard to avoid shallow water as well as to keep clear of one of the other anchored vessels,

the *Laconikos II*. He ordered the engine stopped about a minute and a half after full ahead was rung, by which time they were on a northeasterly heading.

At 0807, the pilot called port control to tell them that the ship had a steering failure and that he would delay the vessel's entrance until the problem was rectified.

Under the supervision of the pilot the steering was checked, by turning the wheel from port to starboard and back again a number of times, moving the rudder hard over from one side to the other. The rudder indicator followed all movements of the wheel. While the checks were carried out, the chief engineer and electrician were watching rudder movements in the steering flat. The chief engineer then went to the bridge where he reported that there was nothing wrong with the steering system.

At 0815, satisfied that the steering was fully operational, the pilot called port control to say that the vessel was 'back on line' and that it would be at the entrance beacons in about 12 minutes.

Olympic Symphony proceeded to the berth without further incident, assisted by two tugs which were made fast at 0856. The vessel was berthed at 1014 using the same steering system that was in use when the malfunction occurred.

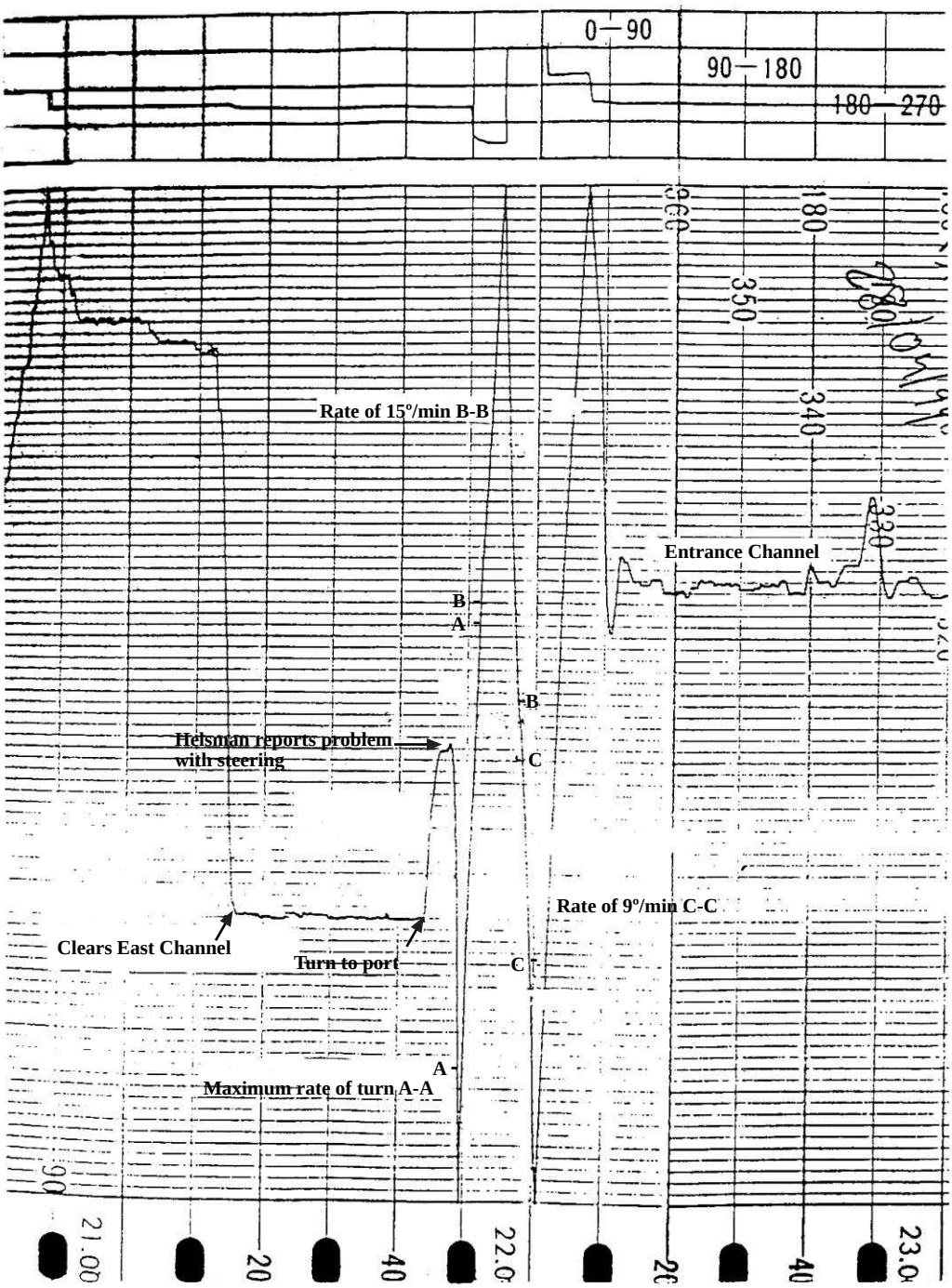
AMSA at Brisbane was informed of the incident and an AMSA surveyor attended the vessel when it berthed. Operational tests on the steering system showed that the steering was functioning normally. Discussions between the surveyor, the master and helmsman revealed that when the malfunction occurred, the wheel was able to rotate, but the helm indicator did not move.

The AMSA surveyor advised the master that the reported failure of the helm indicator to move suggested possible failure of the helm unit. The surveyor issued the vessel a 'Report of Deficiencies' in relation to the steering unit, requiring that the unit be inspected by a technician and that AMSA was to be shown a copy of the service report. The surveyor also recommended that the helmsman be trained in emergency steering procedures.

A technician attended the vessel on 29 April and found that it was possible for a micro-switch roller to jam against the helm indicator slide in the steering console. This had occurred the previous day, causing the steering malfunction. The problem was rectified by the chief engineer, who constructed and fitted a 'ramp' to the top of the helm indicator slide to enable the micro-switch roller to ride over the slide (Fig. 5, pg14). The steering was then tested on systems 1 and 2, and in non-followup mode, and was found fully functional.

A surveyor for the class society, ClassNK, Nippon Kaiji Kyokai, boarded *Olympic Symphony* on 30 April to check the vessel's steering system and found that the vessel was fit to retain her class.

FIGURE 4
Olympic Symphony - course recorder chart



Comment and analysis

The evidence

Olympic Symphony is equipped with a course recorder and an engine movement data logger. In addition to copies of the course recorder trace for the pilotage passage and the data logger printout, the Marine Incident Investigation Unit obtained the following items:

- a copy of the pilot's passage plan and copies of relevant entries in the movement book and logbooks;
- log sheets for the pilot's DGPS, from Brisbane Marine Pilots;
- a copy of the tape recording with conversations the pilot had with port control at the time of the incident;
- a copy of a video recording of the incident made by the master of *Proliv Sannikova*;
- a report by Novamarine Instruments Pty Ltd on the malfunction of the steering system and its rectification;
- the AMSA report of the incident, along with recommendations.

Comparison between the course recorder, the engine data logger and the pilot's GPS printout suggests that the course recorder trace is about 10 minutes slow of ship's time.

Steering failure

A log entry made at 1600 on 27 April indicated that the steering had been tested in preparation for the pilotage as recommended by the International Chamber of Shipping Bridge Procedures Guide.[1] The ship had been on hand steering from 0148 on 28 April and two steering motors had been running since 'stand by' at 0324.

After the incident, the technician from Novamarine Instruments found that a 'helm off midships' alarm had been fitted in the steering console to warn if the helm was moved manually while the autopilot was engaged. This alarm was fitted to comply with the United States Code of Federal Regulations.[2]

The technician also determined that the micro-switch roller for the 'helm off midships' alarm had jammed the helm indicator slide. The micro-switch roller was supposed to ride over the helm indicator slide (Fig. 5, pg14). No problems had been experienced earlier with the steering but on this occasion, as the vessel approached the entrance beacons on manual steering, the micro-switch roller failed to ride over the helm indicator slide. In doing this, it prevented the helm indicator slide from moving further to port than 5° to starboard. This then restricted rudder movements to angles between 5° to starboard and hard to starboard.

A friction clutch between the steering wheel and the gear wheel driving the helm indicator slide and synchronous transmitters for each steering system permitted anticlockwise rotation of the

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[1] International Chamber of Shipping Bridge Procedures Guide, 3rd edition, 1998, 'Manual steering positions'.

[2] The United States Code of Federal Regulation 33, part 157, section 440, sub-part G - 'Interim measures for certain tank vessels without double hulls carrying petroleum oils'.

wheel to port of 5° starboard without corresponding movement of the helm indicator or the synchronous transmitters. This meant that the wheel could be moved to port of 5° starboard without the helm indicator or the rudder moving.

Monitoring the track

Monitoring of the vessel's track was carried out at about 5 minute intervals. After the vessel cleared the East Channel at 0721 and was on a course of 245°, the 2nd mate plotted uncorrected GPS positions on the navigation chart. The course recorder trace, corrected for time, confirmed that *Olympic Symphony* was on a course towards the leading marks in the Entrance Channel when the incident started.

The deck log recorded that, at 0755, the course was altered to 230°, then 220° and 215°(T). However, the course recorder trace indicates that the course was altered from 245° to 230° and that just after this, the steering failed (Fig. 4, pg.10).

There were positions on the chart indicating the track that the vessel followed after the steering failure and the track from the time that the steering was regained (Fig. 5, pg14).

Recall of events

Given the short time frame in which the incident took place, it was difficult for those on the bridge to remember each event that occurred or what was said during this time.

There were varying accounts of the problem with the steering and subsequent events**.** The pilot, in his submission, stated that he had been conning the vessel onto the required course (approx. 212/215°). He asked the helmsman if there was a problem whereupon the helmsman replied that the helm would not move from 5° starboard. The pilot then informed the master that there was a steering problem.

After the initial report that the rudder was not moving, the master and helmsman became aware that there was a response to starboard helm for positions between 5° to starboard and full starboard rudder. There was, however, no further response to port helm, once the rudder returned to the 5° starboard position. Neither the master nor the helmsman appears to have reported this fact to the pilot.

The engine data logger indicates that the engine was put to dead slow ahead and then stop at 0758˚. The pilot ordered these engine movements shortly after the helmsman reported the problem with the steering. It was at this time that the pilot asked for the steering to be put into emergency mode.

The data logger indicates that the engine was then put to half ahead at 0800 and full ahead at 0800˚. This was immediately after the pilot ordered the helm put hard to starboard as *Olympic Symphony* closed on *Proliv Sannikova*. A minute and a half elapsed between the pilot stopping the engine after the steering failure and the engine being put to half and full ahead after the steering responded to full starboard rudder.

The course recorder indicates that, with full ahead and full starboard rudder, the ship had a rate of turn of 30°/min until the pilot reduced the rudder angle to prevent the sterns of the two vessels coming into contact. Thereafter, until about 0820, the trace indicates that an average rate of turn of about 16°/min was maintained until the vessel was on course to approach the Entrance Channel.

There was a lot happening on the bridge during this short period of time as the pilot sought to avert a collision. The 2nd mate was checking positions and advising the pilot of the distances off *Proliv Sannikova.*

The master had checked the steering after it failed. He had telephoned the chief engineer, asking him to check the steering and had also advised the mate to stand by the anchors as there was a problem with the steering.

The pilot's evidence is that an engineer came to the bridge after the phone call made by the master. The pilot presumed that this was the chief engineer. Whichever recollection is correct, the evidence is that an engineer went straight from the engine control room to the steering flat after the report of the steering failure. The presence of an engineer on the bridge had no material bearing on the events following the failure.

When the steering problem became evident, the pilot ordered the helm hard over one way and then the other, a number of times. The pilot recalled watching the helmsman put the wheel over to port and to starboard, but the rudder angle indicator remained at 5° to starboard. In submission, the pilot stated that, in his mind, the helm was locked at 5° to starboard.

The pilot was not aware that the steering was operating to starboard. Neither was he sure that the rudder would respond to starboard helm, but he realised that, with the vessel swinging to starboard, the only possible way to prevent a collision was to order the helm hard over to starboard. When the rudder followed this movement of the helm, the pilot immediately ordered the engine put to full ahead. It was both these responses, the movement of the rudder and prompt use of the engine, that prevented a collision and its consequences.

The only evidence of the cause of the failure was the micro-switch. The rudder should have been able to move to starboard from 5° to starboard at all times. There is no explanation for the pilot's recall that the rudder initially seemed locked at 5° to starboard.

The steering

When the chief engineer got to the steering flat after being told by the master that there was a steering problem, he saw that the rudder was at 31° to starboard and was moving hard over to starboard. The chief engineer called the bridge to inform the master that the steering was functioning. He in turn recalled the master confirming that the steering was operating satisfactorily.

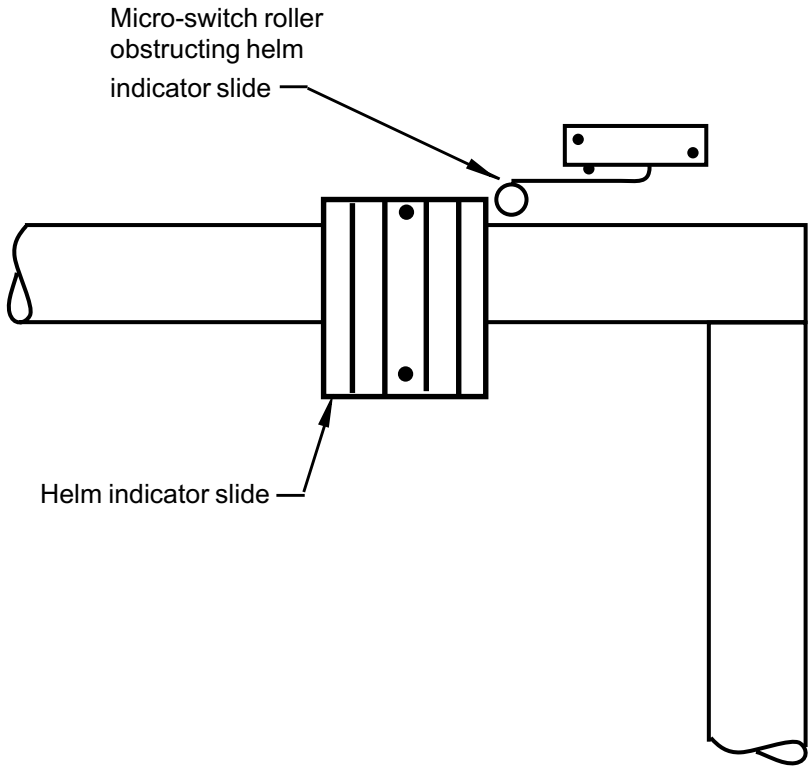
The master might then have thought that the steering was working satisfactorily but almost immediately after this, the pilot ordered midships helm to prevent the sterns of *Olympic Symphony* and *Proliv Sannikova* making contact. The rudder came back towards amidships and stuck at 5° to starboard, so it was apparent that there was still no rudder response for helm angles further to port than 5° starboard. The chief engineer had apparently left the steering flat by this time.

Immediately after *Olympic Symphony* cleared *Proliv Sannikova* and was in safe water, the pilot ordered the engine stopped. At 0802 the engine was put to stop and shortly after this the steering was tested.

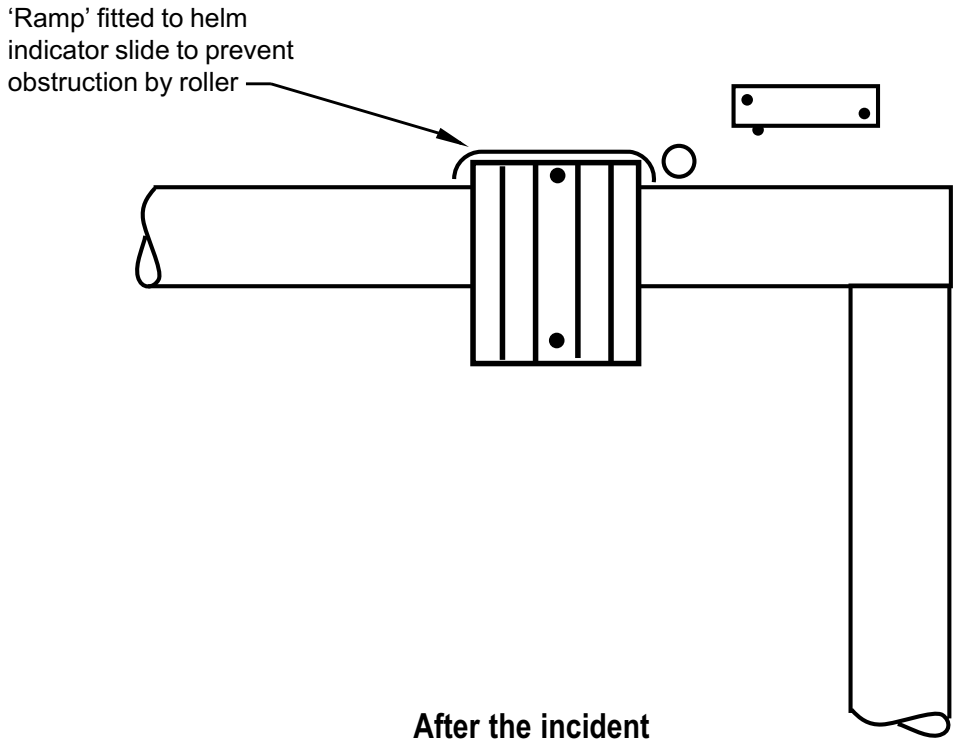
The pilot supervised the testing of the steering prior to entering the channel,

FIGURE 5

Micro-switch roller and helm indicator slide (not to scale)



Prior to incident



After the incident

with the wheel hard over to port, amidships, then hard over to starboard and back again, a number of times for many minutes. The steering worked and the rudder angle indicator moved in accordance with movements of the helm.

The inspector accepts this but does query the thoroughness of the test. From the DGPS chart it would seem that the steering gear was tested, as described, between about 0806 and 0810. This would seem consistent with the course recorder (corrected for time), which shows a slowing in the rate to about 9°/min for 3 min, while on a northeasterly heading. Thereafter, the rate of turn increased to about 15°/min.

The pilot then heard the master ask the chief engineer what had happened and the chief engineer replied that there was no problem. The master told the pilot that the chief engineer had been to the steering flat twice, once on his own and once with the electrician. As far as the chief engineer was concerned, there was no problem.

The pilot decided to berth the vessel and the steering functioned normally thereafter.

The inspector questions the decision to resume the passage to the berth as the cause of the steering failure was still to be determined. It would have been prudent to anchor the vessel and locate the fault, correcting it before proceeding to the berth. There was the risk of a recurrence of the steering problem, which could have resulted in the blocking or partial locking of the Entrance Channel.

Alternative steering systems

At about 0758, when the pilot asked for emergency steering, the master responded by sending an engineer to the steering flat. If the problem with the steering could not be controlled from the bridge, the rudder could be operated from the emergency steering position. However, while the chief engineer was making his way to the steering flat, those on the bridge could have tried the other steering system and if that did not work, changed to non-followup mode.

It was noted during the investigation that a block diagram showing changeover procedures for the steering system, required by Regulation 19-2 (c) (i) of SOLAS Chapter V, was displayed on the bridge. However, the procedures shown in the diagram were not, in the inspector's opinion, adequate as they made no mention of the system changeover switch or mode changeover switch for non-followup steering.

A notice affixed to the top of the steering console stated that if there was a problem with one steering system, the other steering system should be used. No one on the ship's bridge attempted to change from the steering system in use to the other system.

In this case however, changing from no. 1 to no. 2 system would not have overcome the problem of the micro-switch roller interfering with movements of the helm indicator slide. The problem would have existed whether system 1 or 2 was used.

The other alternative was to use non-followup steering. The vessel's Internation Safety Management (ISM) Code procedures manual mentioned the use of non-followup steering in the event of certain problems affecting steering. The manual also stated that the master had to ensure that all deck officers and quartermasters had full knowledge of changeover procedures through exercises.

In the circumstances, although the ISM Code procedures manual covers the non-followup steering system in terms of auxiliary motor failure, in the inspector's opinion it would be reasonable to expect the master or 2nd mate to try the non-followup mode.

Although the pilot requested emergency steering, there were no attempts to change from one steering system to the other or to use non-followup steering. Use of non-followup steering would have bypassed the problem with the micro-switch.

There is no criticism of the master's action in telephoning the chief engineer. However, the failure to change to the other steering system or to the non-followup mode, shows poor procedures and a lack of understanding of the steering system. There was a lack of urgency on the part of the master and an underestimation of the danger of either a collision with the anchored vessel or a possible grounding.

Again, the inspector questions the risk management processes of the ship when it was decided to enter the Entrance Channel. Despite the fact that the vessel had experienced a problem with the steering, no one was stationed at the emergency steering position when the passage to the berth was resumed.

The steering console

The steering console aboard *Olympic Symphony* was a PR 7507 installed by Tokyo Keiki Co Ltd (now TOKIMEC INC.), when the vessel was fitted out. The alarm unit fitted was a Gylot Marine GM-HA 165.2 Helm Adviser, which had been retrofitted. It was thought that the alarm unit was fitted at the previous dry-docking of the vessel. The sensor for this alarm was a micro-switch, which was activated by the slide supporting the helm indicator. The alarm was activated at helm angles greater than 5° port or starboard in the auto mode.

TOKIMEC INC., Japan was informed of the incident and was asked for certain details of the steering system by the MIIU.

The inspector also wrote to the US National Transportation Safety Board and the Ministry of Mercantile Marine in Greece to inform them of the incident. Both the NTSB and the Ministry of Mercantile Marine were asked to consider whether action should be taken to check other tankers operating with such mechanical alarm systems.

In reply, TOKIMEC INC. advised the MIIU that their steering console had been installed on the vessel in April 1990 and that the US Coast Guard requirements came into effect in November 1996. The 'helm off midships' alarm was not fitted to their autopilot system at installation, nor did they have any report in their records that any alarm unit was retro-fitted. They surmised that the Gylot alarm had been retro-fitted without their being consulted.

TOKIMEC INC. stated that they knew neither Gylot Marine nor what the GM-HA 165.2 Helm Advisor was, and that they did not recognise or authorise this alarm unit. TOKIMEC INC. manufactured their own design of alarm unit, the 'Wheel off-centre alarm unit', using 'photo sensors' to prevent mechanical problems.

Conclusions

These conclusions identify the different factors contributing to the incident and should not be read as apportioning blame or liability to any particular organisation or individual.

Based on all the evidence available, the following factors are considered to have contributed to the incident:

1. The micro-switch roller for the 'helm off midships' alarm was liable to obstruct the helm indicator slide.

2. The 'helm off midships alarm' was not approved by the manufacturers of the steering console and had been installed without reference to them.

3. The communication by the bridge team to the pilot was deficient, in that the master and the helmsman were aware that there was a response to the movements of the helm to starboard of 5° starboard only, but the pilot was not informed of this.

4. The master did not try the other steering system or change to the non-followup mode.

5. It is possible that the pilot, asking for emergency steering, prompted the master to think of the emergency steering position in the steering flat rather than to consider other alternatives available on the bridge.

6. The procedures available to the bridge team did not specify action to be taken following failure of both steering systems.

7. The ship's bridge team was not familiar with the steering systems and modes available to it.

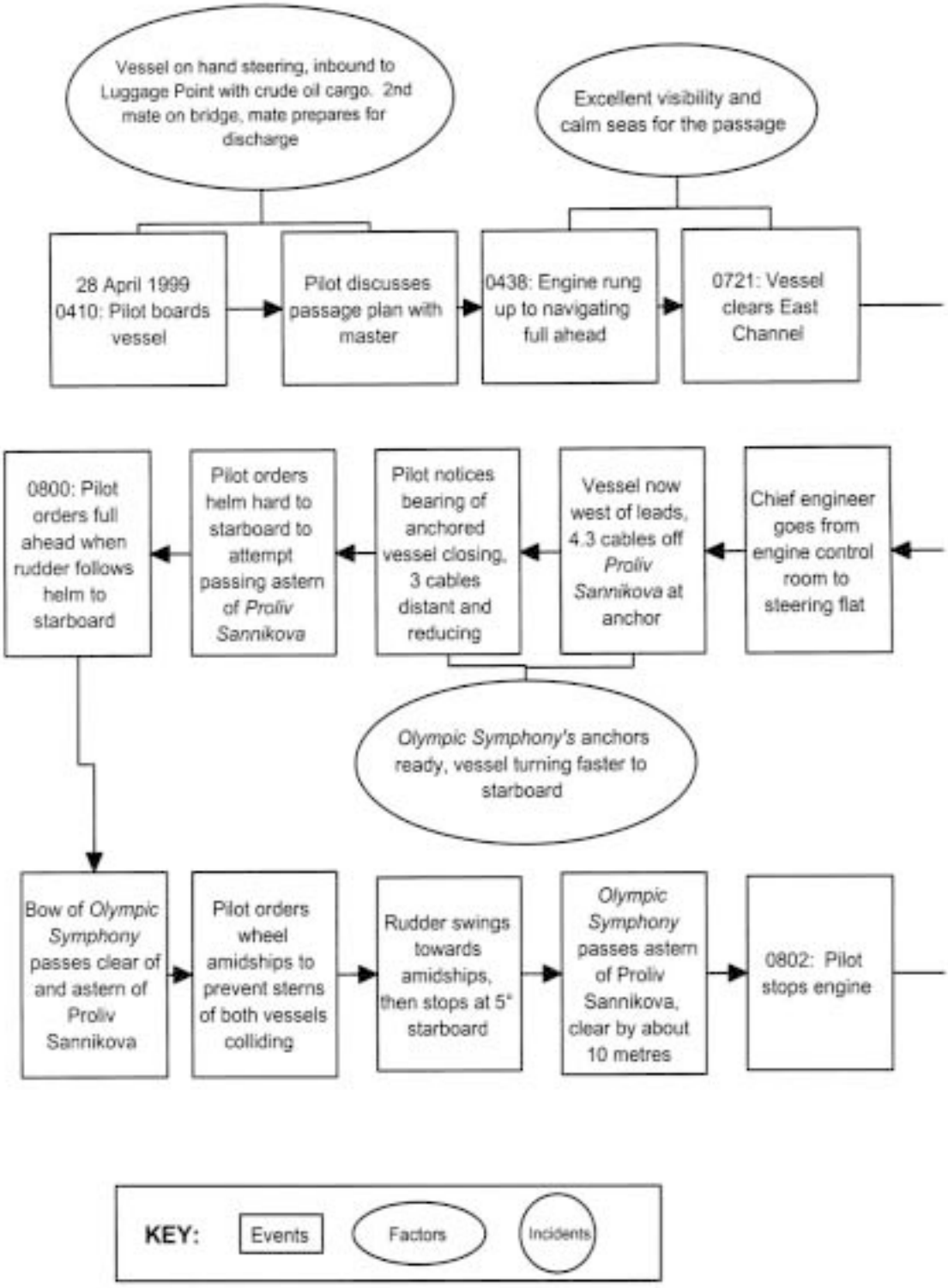
8. Given the unknown cause of the temporary steering failure, insufficient consideration was given to the risks and possible consequences of transiting the Entrance Channel.

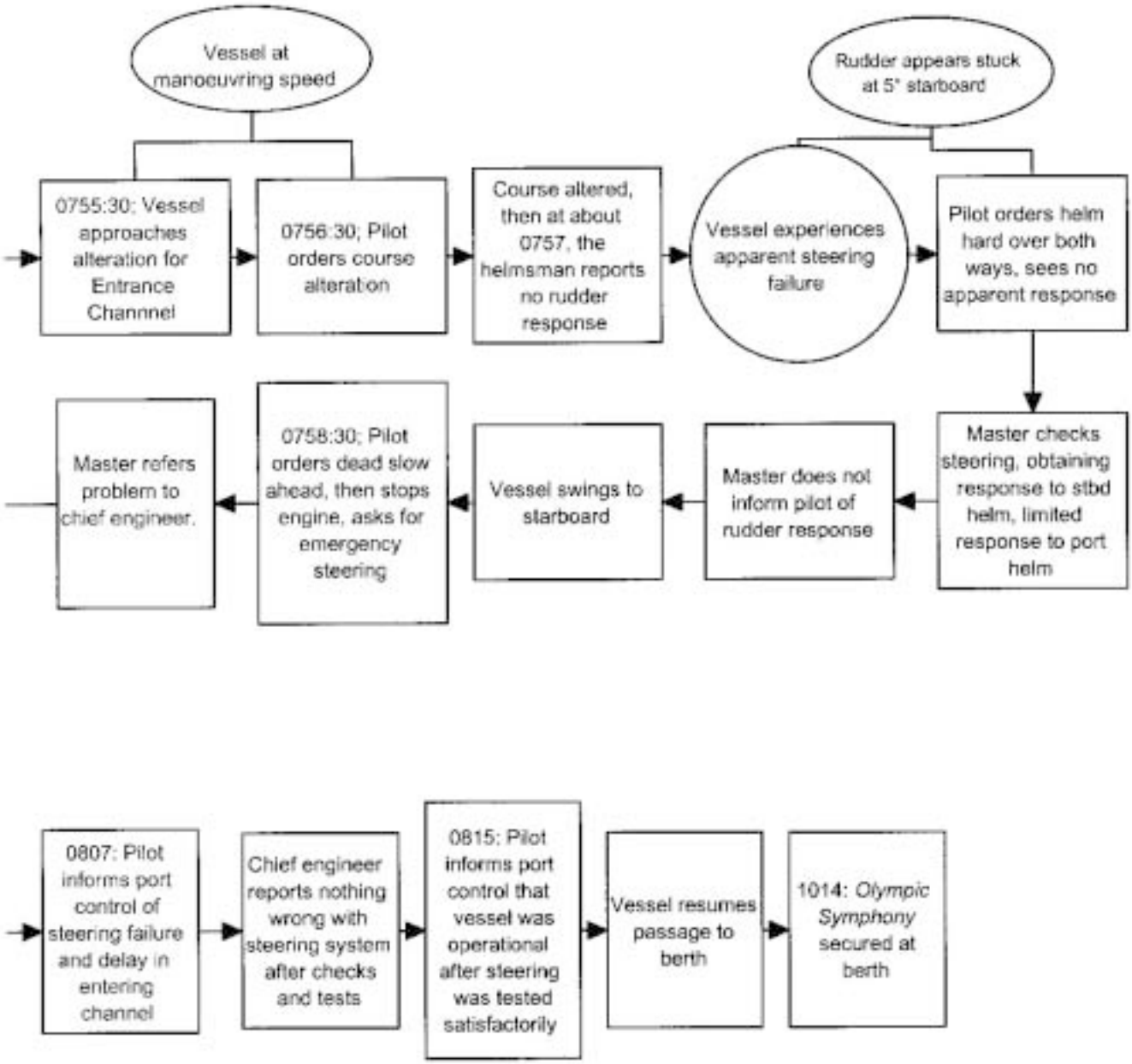
9. Neither the master nor the pilot offered port control sufficient explanation of the incident to allow those on duty to make a judgement as to whether or not the harbour master should be informed and conditions imposed on an entry into port by *Olympic Symphony*.

Taken as promptly as they were, the actions of the pilot averted a collision.

FIGURE 6

Events and causal factors chart




Vessel at manoeuvring speed
Rudder appears stuck at 5° starboard
0755:30; Vessel approaches alteration for Entrance Channnel
0756:30; Pilot orders course alteration
Course altered, then at about 0757, the helmsman reports no rudder response
Vessel experiences apparent steering failure
Pilot orders helm hard over both ways, sees no apparent response
Master checks steering, obtaining response to stbd helm, limited response to port helm
Master does not inform pilot of rudder response
Vessel swings to starboard
0758:30; Pilot orders dead slow ahead, then stops engine, asks for emergency steering
Master refers problem to chief engineer.
0807: Pilot informs port control of steering failure and delay in entering channel
Chief engineer reports nothing wrong with steering system after checks and tests
0815: Pilot informs port control that vessel was operational after steering was tested satisfactorily
Vessel resumes passage to berth
1014: *Olympic Symphony* secured at berth

Submissions

Under sub-regulation 16(3) of the Navigation (Marine Casualty) Regulations, if a report, or part of a report, relates to a person's affairs to a material extent, the inspector must, if it is reasonable to do so, give that person a copy of the report or the relevant part of the report. Sub-regulation 16(4) provides that such a person may provide written comments or information relating to the report.

The final draft of the report, or relevant parts thereof, was sent to the following:

The pilot of *Olympic Symphony*

The master, 2nd mate, chief engineer and the helmsman of *Olympic Symphony*

A submission was received from the pilot and the report was amended where necessary.

Details of *Olympic Symphony*

IMO no.	8900505
Flag	Greece
Classification society	ClassNK
Ship type	Tanker
Owner	Clevedon Transportation Co., Liberia
Operator	Olympic Agencies (UK), London
Year of build	1989
Builder	Sumitomo Heavy Industries, Japan
Gross tonnage	52 086
Net tonnage	29 506
Summer deadweight	96 672 tonnes
Length overall	232.04 m
Breadth extreme	42.00 m
Draught (summer)	14.027 m
Engine	Sulzer 6 RTA 62
Engine power	14 200 kW
Crew	26 (13 Greek, 12 Filipino, 1 Honduran)

AMSA
Australian Maritime Safety Authority

REPORT

FILE No:
DATE: **21 March, 2000**
SUBJECT: ***OLYMPIC SYMPHONY*** **– STEERING FAILURE**

VESSEL PARTICULARS

Name:	***Olympic SymphonyOlympic Symphony***	Class:	**NKK**
IMO No.:	**8900505**	GRT:	**52086**
Flag:	**Greek – Piraeus**	DWT:	**96672**
Official No.:	**9665**	Cargo:	**Crude Oil**
Type:	**Crude Tanker**	Next Port:	**Singapore**

INCIDENT DETAILS

〈 **Location of occurrence:** Approaching entrance beacons to Brisbane River

〈 **Incident:** During pilotage of vessel into Brisbane, helmsman noticed helm indicator and rudder indicator stuck at 5ϒ stbd and would not return to midships, despite movement of wheel. Pilot ordered dead slow and stand by to let go anchors. Vessel's report states that attempts were made to rectify the steering fault by moving helm from port to starboard but helm remained at 5ϒ. (See copy of report appended)

It was then noted that the helm responded to further starboard movement. In order to clear shallow water as soon as possible, and to clear an anchored vessel, hard to starboard and full ahead was ordered. The vessel vessel swung, clearing the anchored vessel by 8 metres.

〈 **Actions following Incident:** Vessel engines were stopped. Steering was tested on board and found to be operational again. Tests carried out with chief engineer present revealed no cause for the failure. The vessel was then berthed without further incident.

〈 **AMSA Inspection:** AMSA Brisbane was notified both by 'phone and fax of pilots report on SV-HH (Copy appended). MIIU and Queensland Transport undertook a combined investigation into the incident.

The AMSA Surveyor attended the vessel on berthing.

All operational tests carried out on board showed normal operation. Discussions with the helmsman and master revealed the following:

1. When malfunction occurred the wheel was able to rotate, but the helm order indicator did not move.

2. During and after malfunction, no attempts were made to changeover either between systems or to non follow-up steering with the changeover switches on the helm console (See picture 1, below).
3. Berthing was completed in the same mode of steering as that in which the malfunction occurred. Despite no cause for the malfunction being established.

The manual for the helm unit was also inspected.

Picture 1 – Helm Controls

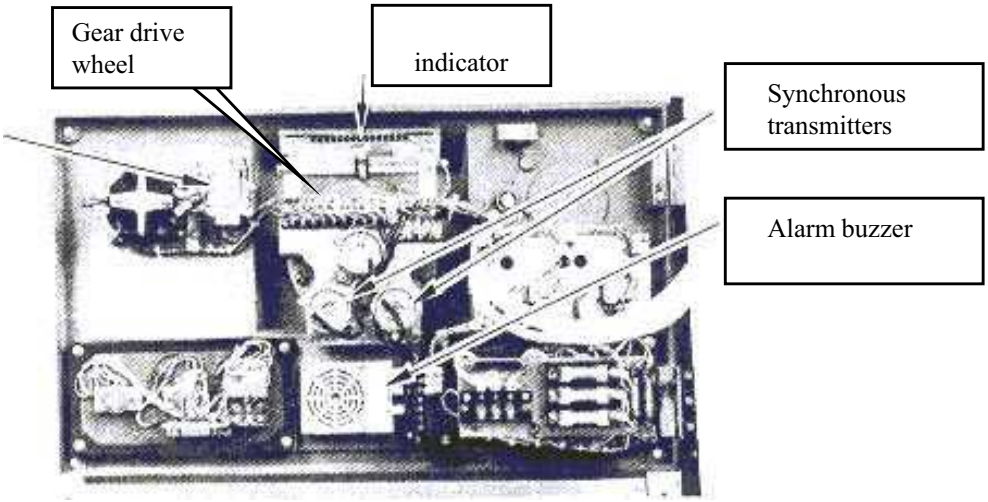
Following these discussions and tests an SV-CC was issued to the master stating the following:

1. Reported failure of helm order indicator to move when steering wheel was moved indicates possible failure of helm unit. Recommend unit be inspected by technician to ensure correct operation – AMSA to be shown copy of service report.
2. Recommend helmsman be trained in emergency steering procedures.

Steering System

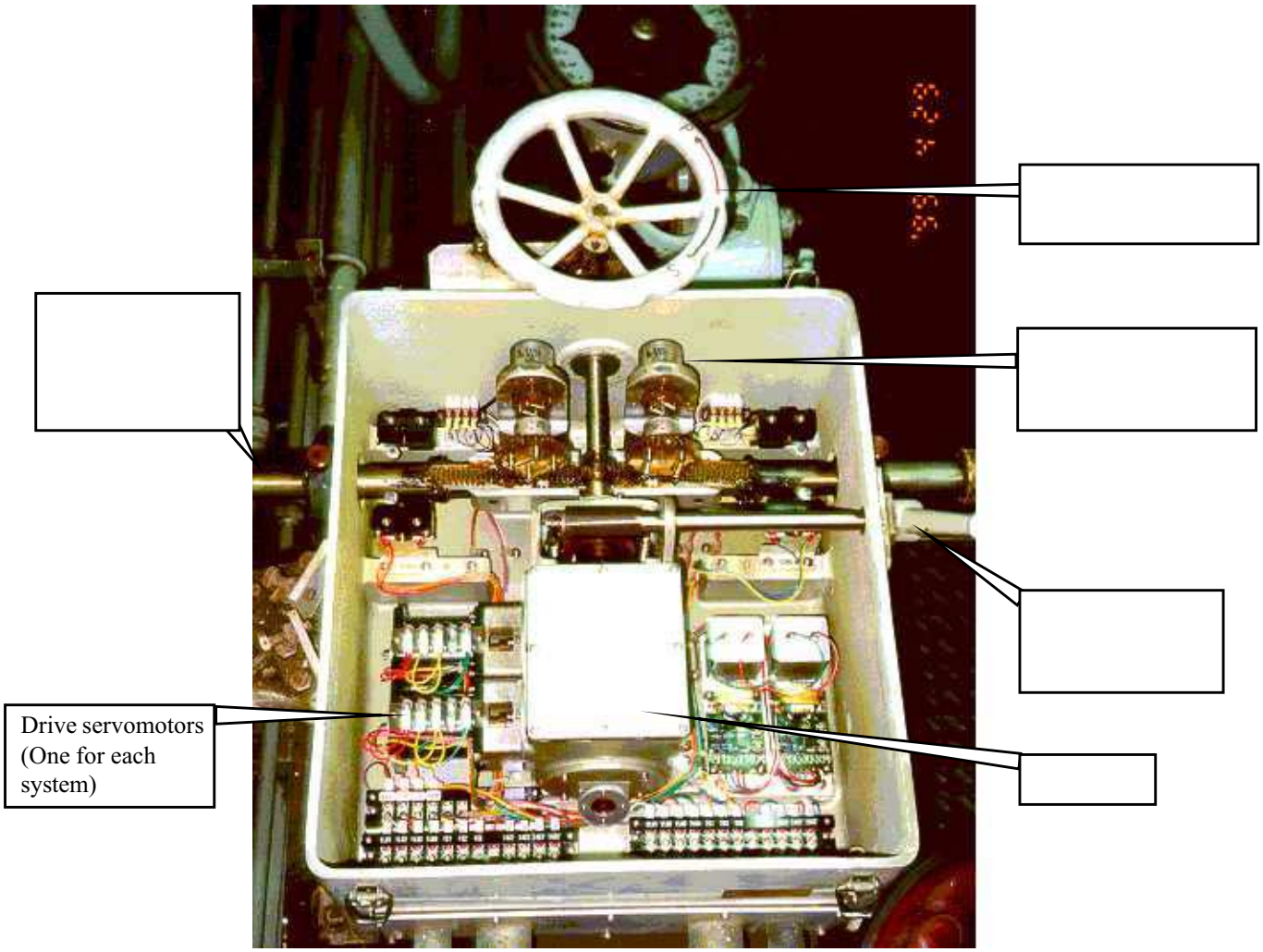
In hand steering mode the system should function as follows:

1. Wheel is turned which drives gear wheel (See picture 2) via friction clutch.



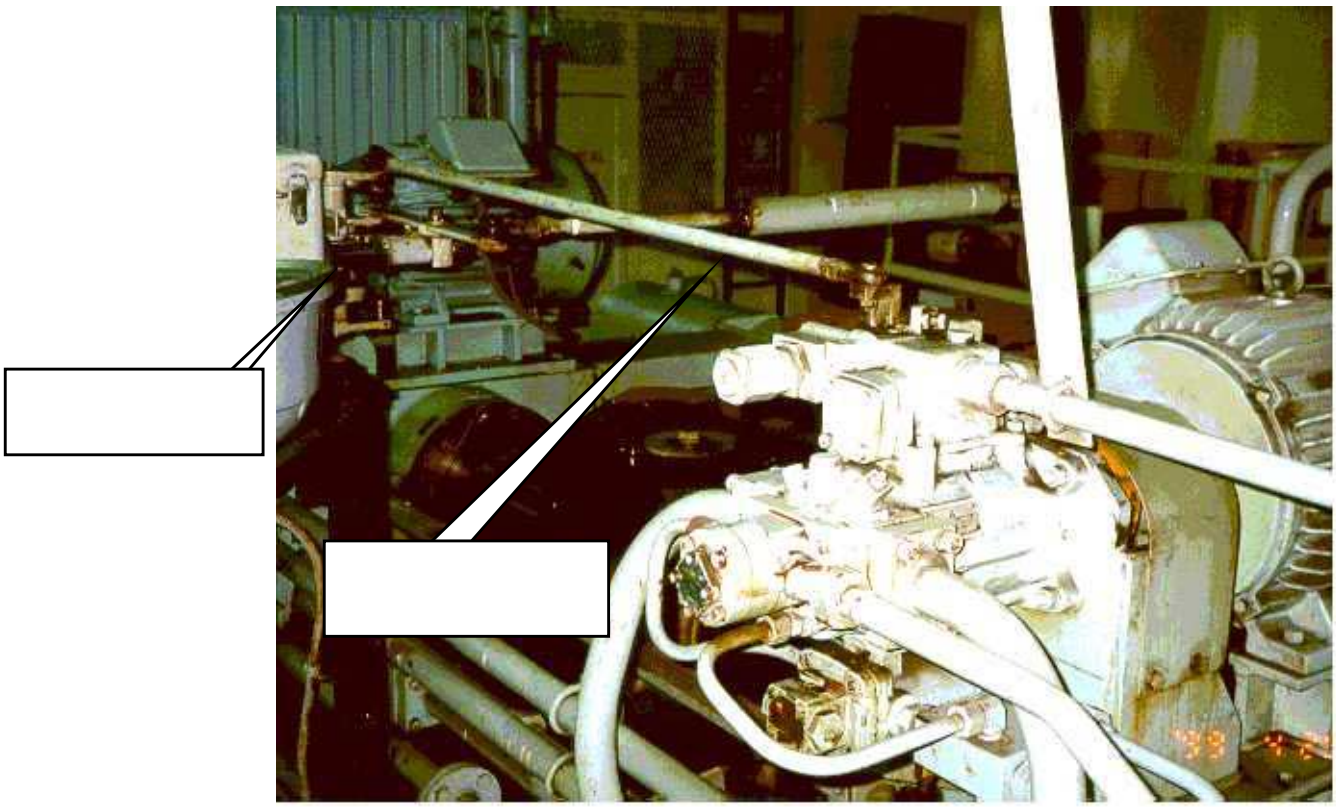
Picture 2 – Back of helm unit panel

2. Gear wheel drives helm order indicator and also two synchronous transmitters.
3. An error signal is generated proportional to the difference between the positions of the synchronous transmitters in the helm transmitter unit and synchronous transmitters in the telemotor drive unit at the steering gear. The synchronous transmitters in the telemotor unit are geared to the telemotor output shaft (See picture 3).



Picture 3 – Telemotor drive unit at steering gear

4. The telemotor drive unit uses the error signal to generate a drive signal to the servomotors (See picture 3) which drive through the gearbox to position the output shaft.
5. When the output shaft position is such that there is no further error signal between the synchros in the helm and telemotor units, the servomotor stops.
6. The output shaft from the telemotor unit drives, via a hunting arrangement, the swashplate controls of the two main steering gear hydraulic pumps. (See picture 4, below)



Picture 4 - Steering gear

Technician's Findings

Copy of technician's report is appended. In summary he found that a "helm off centre" alarm had been retrofitted to the unit; not by the manufacturer. This alarm consisted of a microswitch, which was activated by the helm order indicator pointer when in the centre position. When the malfunction occurred the switch presumably had moved into a position which prevented the movement of the pointer back to the centre position. As the pointer is geared into the synchro drives these also could not move. The wheel could still turn due to the friction clutch slipping. The problem was rectified as per the technician's report.

Had the "System" switch been switched to the alternative system the problem would not have been bypassed, but had the "Mode" switch been moved to NFU and the NFU tiller lever used, the problem would have been bypassed and steering regained.

OPINION

1. This fault as found by the technician could have occurred or recurred at any time.

2. The emergency steering diagram and instructions posted on the side of the steering console to comply with SOLAS requirements makes no mention of the use of the system changeover switch or mode changeover switch and only refers to bridge or emergency (local) steering. This diagram is more relevant to the emergency steering position in the steering compartment.

3. The failure of anyone to attempt any changeover of steering systems or modes during the incident indicates a lack of understanding by all parties of the functioning of the system and a lack of realistic training in emergency steering. Emergency steering drills in compliance with SOLAS requirements are carried out, generally only involving changeover to local steering.

Michael Kinley
11 May 1999