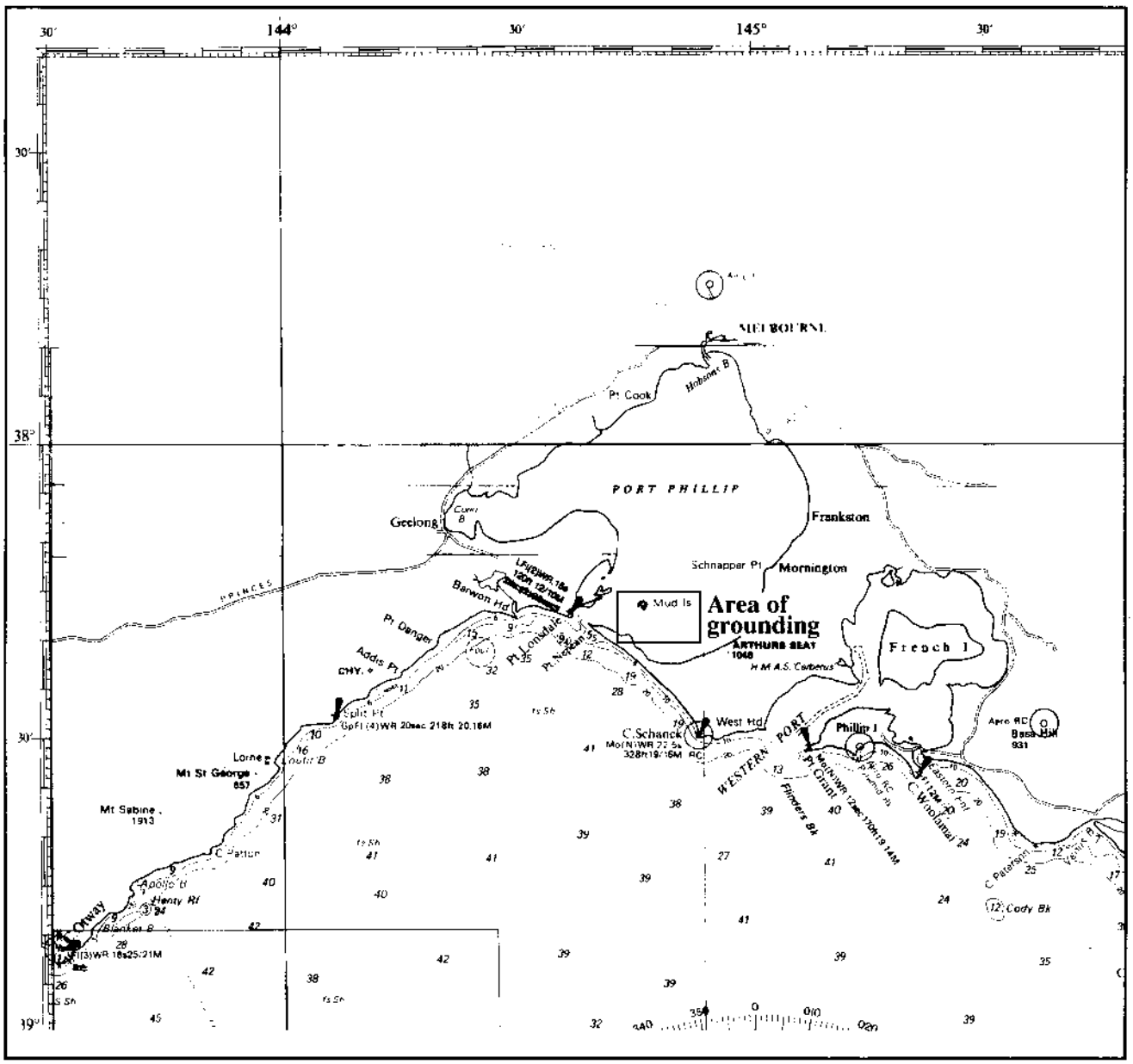
Content

ATTACHMENT

DIAGRAMS & ILLISTRATIONS



Part of chart Aus 422 showing area of grounding

Summary

The German flag, 35,303 gross tonnes container ship Berlin Express, while proceeding through the dredged cut, in the South Channel, Port Phillip Bay, en route to Melbourne, took a rapid sheer to starboard, as a result of which the ship grounded adjacent to South Channel Pile beacon.

Assisted by two tugs from the Port of Melbourne, the ship was successfully refloated 10 hours later, on the next high tide.

The ship suffered no structural damage, and no pollution occurred as a result of the grounding.

Information sources

Information was provided by the Master, Chief Officer, Watch Officer and Apprentice of Berlin Express, and the Port Phillip Pilot engaged by the ship.

The Inspector gratefully acknowledges the assistance of:
Port of Melbourne Authority;
Survey staff, Melbourne Office, Australian Maritime Safety Authority;
Professor L. J. Doctors, University of NSW.

The ship

The Berlin Express, is a 35,303 gross tonnage container ship, 233.85m in length overall, built at the Hudong Shipyard, Shanghai, in 1989, and was the first of a new class of ship designed by Hapag-Lloyd of Germany. Designed to be operated by a crew of just 14, including the cook and a steward, the ship is highly automated, with advanced electronic control systems not found on most commercial ships.

The four watch-keeping officers are all dual disciplined and have both nautical and engineering responsibilities. They work a 10-hour day, spending six hours on bridge watch, two hours in the engine room and two hours working on their other responsibilities. The whole crew remain together as a unit for a considerable time and the four officers rotate responsibilities on a voyage basis.

The bridge is designed for continuous one-man operation, including during port entry and berthing operations. All controls - engine, steering and communications - are contained at the command position, located on the starboard side of the wheelhouse, and at the remote stations on the bridge wings.

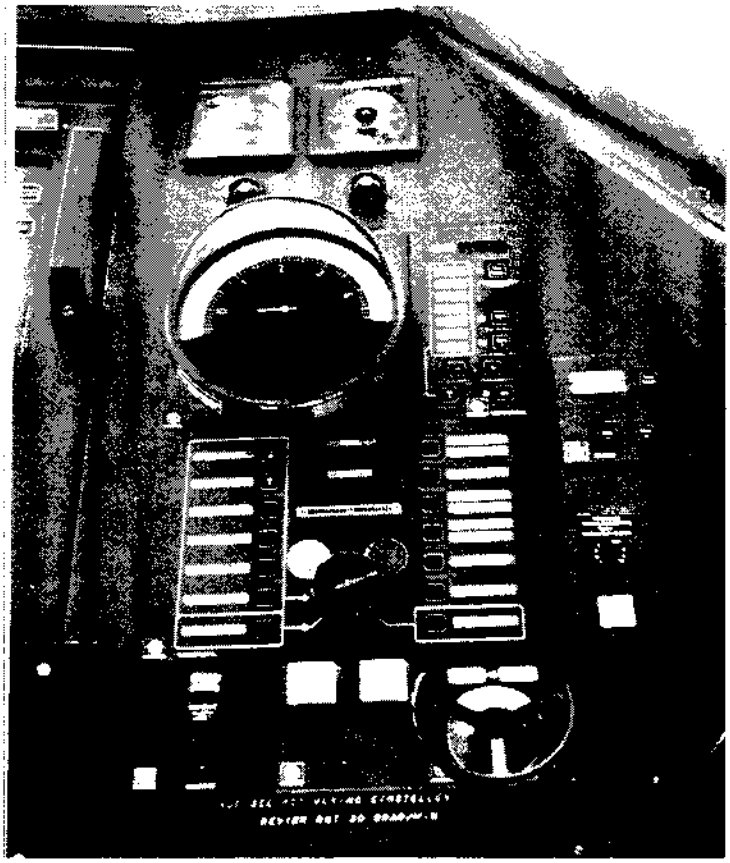
The ship is equipped with an Anschutz "Nautopilot A" automatic steering system, a computerised system which has provision for adjustment of maximum rudder angle setting, rate of turn, radius of turn, and for either economy (open sea) or precision (port) steering accuracy. The required course is entered into the computer by manual depression and rotation of the control knob, which is rotated until the required course appears on the set course digital readout. The ship's actual heading is shown in the digital heading display. When altering course, one degree of course alteration requires about 15 degrees rotation of the control knob. The computer is programmed to apply rudder movements according to the pre-set parameters, to bring the ship on to the required course. If the ship fails to respond for any reason, the computer will apply more rudder.

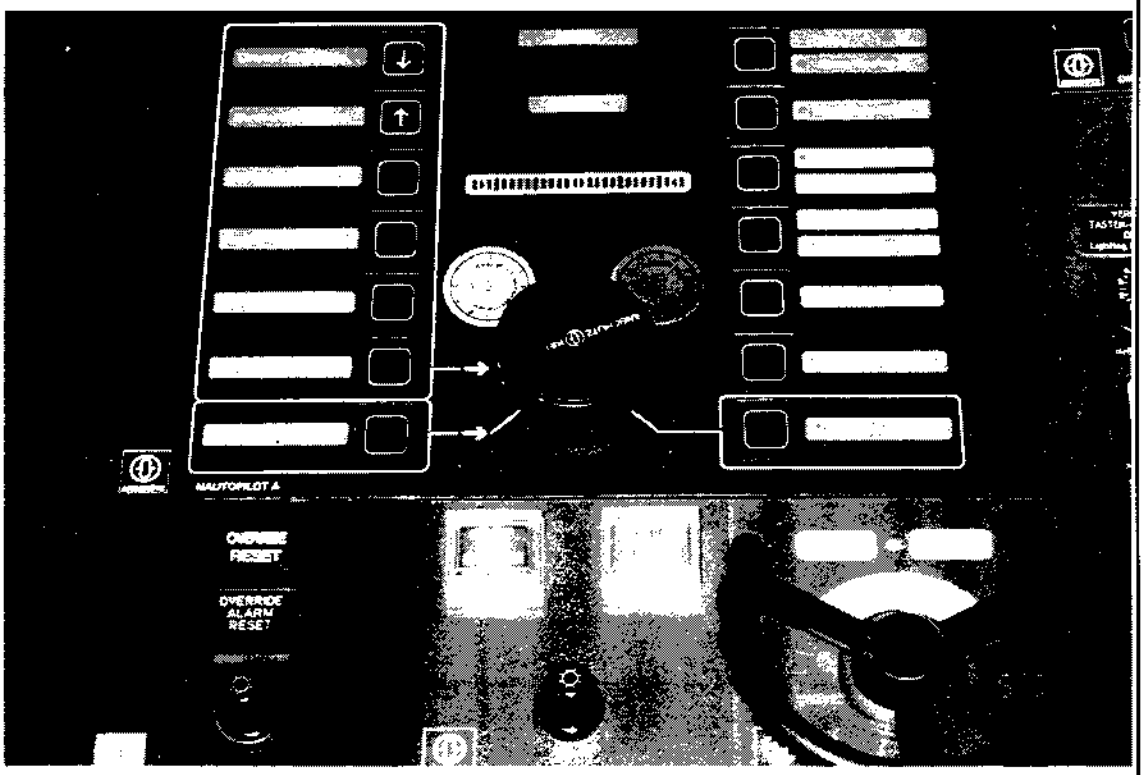
The computer can be over-ridden by operating the auto-tiller, the rudder movement and course then being under direct manual control. When the auto-tiller is used, the set course digital readout automatically changes from course set to actual ship's heading.

For arrival off a port the normal bridge manning comprises the Master, the Watch Officer and one Mechanic, the latter preparing the pilot ladder, the anchors, hoisting flags, meeting the Pilot and such other duties as required. When the crew go to mooring stations, the Watch Officer proceeds to the forecastle and the Mechanic to the poop, leaving just the Master and Pilot on the bridge.

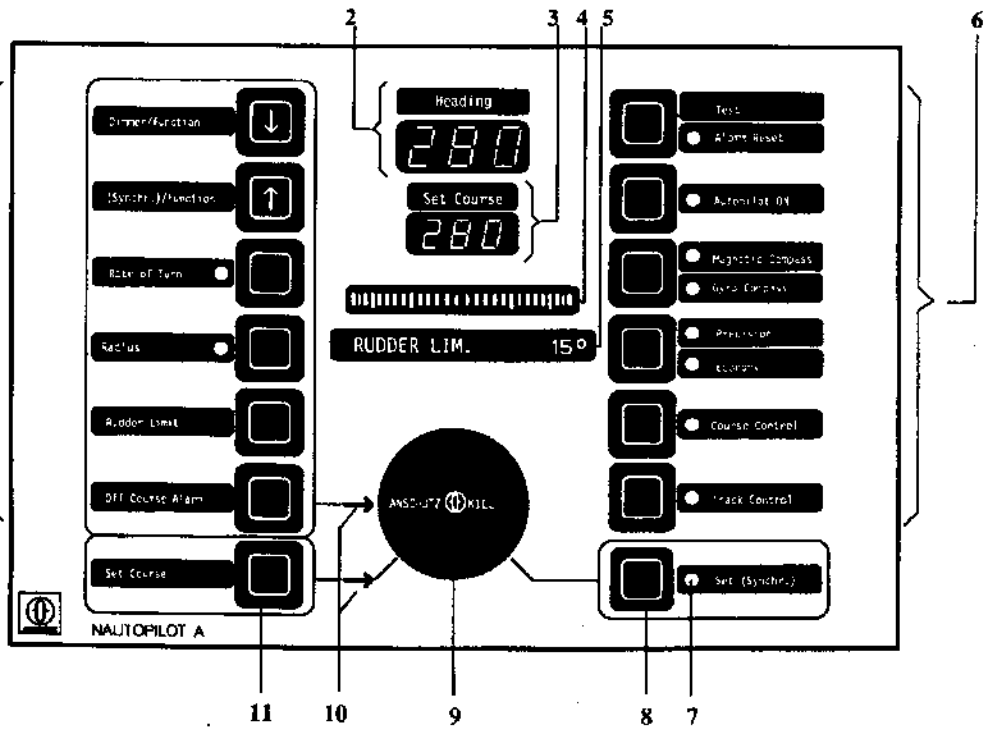
Although the ship is fitted with a manual steering position, sited on the centre line in the wheelhouse, at least one of the ship's Masters had used the automatic steering from berth to berth, including transits of the Suez Canal, right from the maiden voyage. The only exception to this was during manoeuvring alongside, when the Master changed over to bridge wing remote stations, which he himself controlled.

The ship has two electric steering motors, housed in the steering flat with hydraulically driven rams connected to the top of the rudder post. Each is capable of operating the rudder independently, but the two motors may also be operated in parallel. Only the starboard, No 1 steering motor is connected to the emergency power system, but both motors can be switched on and off from the command station on the bridge.





Photographs of Berlin Express Anschutz Nautopilot controls



1 Function push-buttons for checking and alteration of inputs
2 Heading (actual course) display
3 Set course display
4 Analog display
5 Alphanumeric display
6 Operating mode selector buttons
7 Status indications (LED)
8 Value input push-button
9 Rotary knob
10 Arrows
11 Set course push-button

Anschutz Nautopilot A-1 control panel details

Sequence of events

Berlin Express sailed from Hamburg on 31 March 1993, bound for Rotterdam, where it was to complete loading, before proceeding to Australian and New Zealand ports via the Suez Canal. On board, in addition to the design crew number, were a designated Chief Engineer, Second Engineer (reefer specialist) and an Apprentice. However, the four 'standard' officers maintained their normal areas of responsibility and watch-keeping schedules.

For port manoeuvring operations, the Apprentice was stationed on the bridge and, as part of his training, manned the command station, and operated the engine and steering controls, monitored by the Watch Officer. The Apprentice performed this duty during the ship's departure from Hamburg, arrival and departure Rotterdam, and arrival and departure Fremantle.

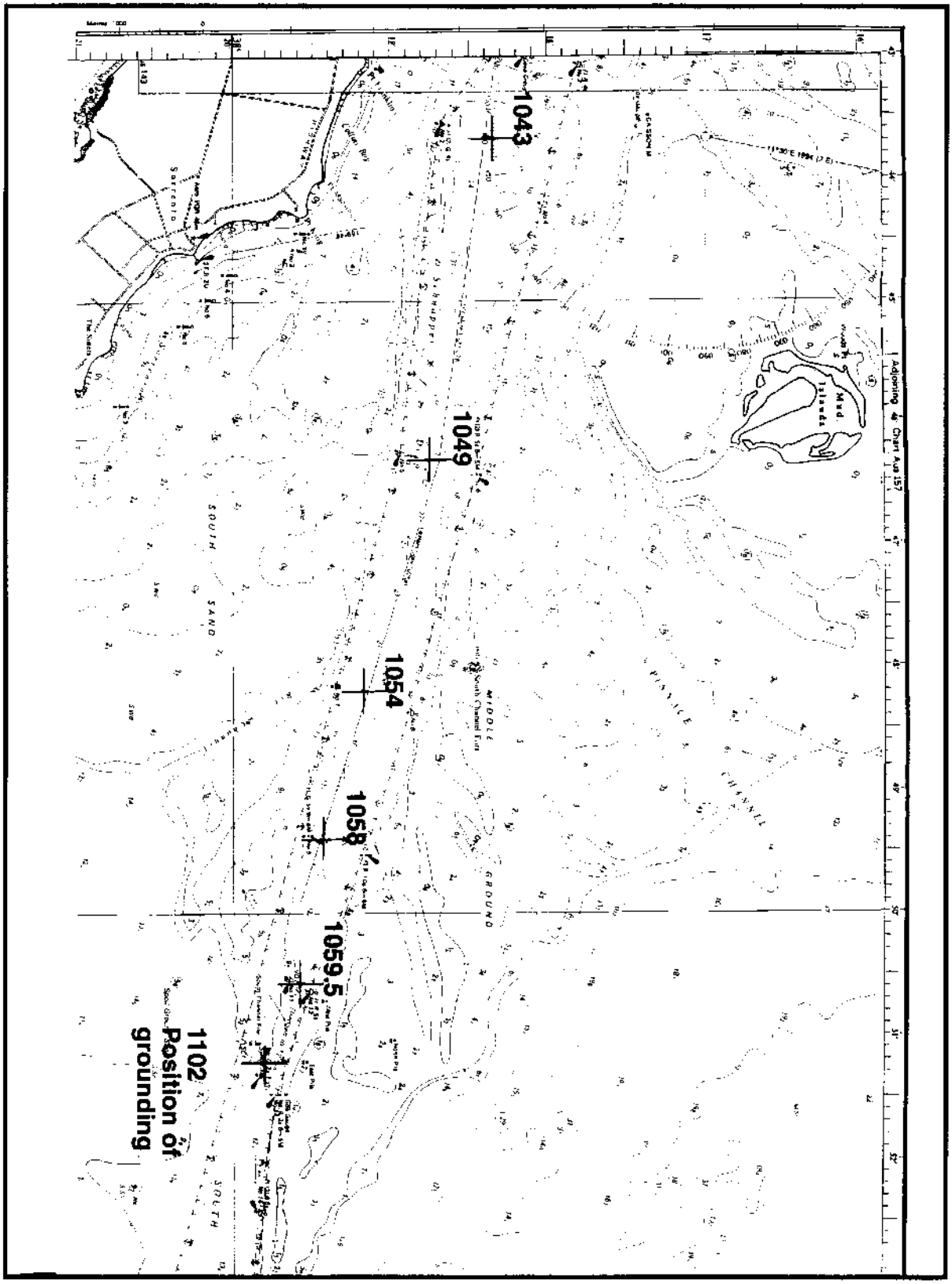
The ship was due to arrive at the Port Phillip pilot station, off Port Phillip Heads, at 1000 on Sunday, 2 May. The day before, the Master decided the Apprentice would act as Watch Officer for arrival at Melbourne, monitored by the Officer and himself.

At 0800 on 2 May, the Master proceeded to the bridge, joining the bridge team consisting of the Watch Officer, the Apprentice and one Mechanic. The Apprentice, acting as Watch Officer, calculated when the ship would need to start reducing speed to pick up the Pilot. At 0900, he contacted Point Lonsdale signal station on VHF 16 to confirm the ETA.

As soon as the ship had reduced to manoeuvring speed, the Apprentice carried out the pre-arrival checks and tests, as detailed in the United States Coast Guard Check List "S2", reproduced in the front of the Deck Log Book. This included stopping the engine and testing astern movement, and testing the manual and remote steering systems. The steering motor in operation was No 2 (port).

The Port Phillip Pilot boarded at 1005 and the Master provided him with details of the ship, including the draught of 10.04m forward and 10.67m aft, and informed him that the ship had a large rudder and steered well. Learning that the Pilot had no previous experience of the ship, he explained that the ship operated on autopilot, not manual steering and requested that the Pilot give course orders, rather than helm orders. Although the Pilot had strong reservations about the use of autopilot in confined waters, he agreed to the Master's request.

On taking over the con, the Pilot saw that the ship was heading 065 degrees and ordered a course to bring the ship on the leads for passing through Port Phillip Heads.



Part of chart Aus 158, showing Schnapper Deep and the dredged cut

Monitored by the Watch Officer, the Apprentice, having repeated the Pilot's order, made the necessary adjustment to the autopilot. Speed was increased to Full Manoeuvring Speed, a speed of 15.5 knots.

As the ship proceeded inwards, the Pilot received advice over the VHF from Point Lonsdale signal station that there was one outbound vessel - the deep draught bulk carrier Ios - that had departed Geelong at 0710. The Pilot calculated that Ios would pass through the dredged cut, a short section of dredged channel between South Sands and Middle Ground banks, before Berlin Express arrived in that area.

Point Lonsdale lighthouse was passed abeam to port at 1020 and as the ship passed Point Nepean to starboard, course was altered to 090 degrees. Once Shortland Bluff lighthouse was abaft the port beam, course was altered to 105 degrees, to shape up for Schnapper Deep. During this time, the Pilot had been monitoring how the ship steered in the autopilot mode and found that it handled well.

At 1030, with the ship steadied on the 105 course, the engine speed was increased to 70 rpm, to maintain speed against the ebbing tide. The course was adjusted as necessary for passage through the Schnapper Deep, the Pilot keeping the ship to the south side of the channel, in preparation for passing the outbound deep laden bulk carrier Ios, in a port to port passing situation.

The Apprentice remained at the command position, while the Watch Officer alternated between the radar position and a position just behind and to the left of the Apprentice, where he could monitor his actions. The Master stationed himself at the plotting table, behind and to the right of the Apprentice, from where he was able to monitor the ship's course and the command position displays, including the heading, set course and rudder indicators.

No 3 buoy was passed at 1043, No 5 buoy at 1049 and No 7 buoy at 1054, at which time the Pilot ordered a course alteration to 096, to bring the ship on to line for passing through the cut, delineated by buoys 11, 12, 13 and 14.

No 9 buoy was passed at 1058, at which time Ios was clearing the cut and very shortly afterwards Ios passed by on the port side. As the line of the buoys opened, the Pilot ordered a course alteration to 105 degrees, to pass between buoys 11 and 12. With the ship on the new course, the Pilot looked astern, noting from the wake that the ship was yawing about two degrees. Looking ahead, he realised the course of 105 degrees would take the ship close to No 14 buoy, on the north side of the channel and, as the ship was passing No 11 buoy, he ordered a course adjustment to 107 degrees. The Apprentice repeated the new course required and, monitored by the Watch Officer, applied the two-degree adjustment to the autopilot.

He then watched the ship's bow swinging across the shore-line ahead.

Everyone on the bridge realised simultaneously that the ship was swinging too rapidly to starboard. The Apprentice put the auto-tiller to port five and then port 10, cancelling the over-ride alarm as he did so. Both the Master and the Pilot ordered "hard to port", the Master leaning past the Apprentice and performing the function himself, noting that the rudder angle indicator showed starboard 15. The Apprentice noted that the digital course indicator showed 110 at about this time. The Master then ordered the Mechanic to the manual steering position, ordered him to put the wheel hard to port and switched over from autopilot to manual.

The swing to starboard slowed then stopped, by which time South Channel Pile beacon was fine on the port bow. The ship then started to swing back to port. Fearing that the stern would swing into the bank, and so possibly result in damage to the rudder and propeller, both the Master and the Pilot ordered stop engines and midships the wheel, and then "full astern". From the data-logger record, the time for the stop command was 1102. When the ship had swung back to a heading of about 111 degrees, it grounded on the starboard bank of the cut, heeling over to port as it did so. The ship then came to a stop, between South Channel Pile beacon and No 13 buoy, on a heading of 109 degrees.

The Pilot advised the Point Lonsdale signal station that the ship was aground, and then he and the Master attempted to refloat the ship, using the main engine and the bow thruster. Initially the engine was run astern, and then ahead with the rudder hard to starboard and the bow thruster on full port thrust, in an attempt to slide the ship sideways off the bank. However, this was aborted very quickly due to concern over causing damage to the starboard bilge keel area, if the ship did slide sideways. With the falling tide, the ship was becoming more firmly aground and tug assistance was necessary.

The Master telephoned the Melbourne agent and the ship's owners in Hamburg, advising them of the grounding and requested the Pilot to order the two most powerful tugs available in Melbourne. The Chief Officer checked all compartments on the indicator panel, for indications of water ingress - there were none - and some of the crew were detailed to check the soundings around the ship.

In preparation for refloating, the Pilot requested the assistance of a second pilot, a survey chart of the area of grounding was obtained from the Port of Melbourne Authority and a salvage expert boarded to provide advice. As the

ship was listed to port, it was decided to transfer ballast and other on-board liquids so as to induce the same amount of list, in order that when refloated, the ship would do so more easily, bodily and without causing damage.

The tugs, Gabo and Keera, arrived from Melbourne, the masters were briefed on the refloating operation and, on advice from the salvage expert, were instructed that they should pull in a direction 45 degrees abaft the ship's port beam.

The tugs were made fast, one forward, the other on the port quarter, at 2108. At 2109, the engine was put to half astern, then full astern, and the bow thruster on full port thrust. After 10 minutes, by which time the after tug had attained full power, the bow thruster was given a full thrust kick to starboard. After about another two minutes the ship started to move slowly to starboard and then slowly astern. When the astern movement was steady, the bow thruster was put on full port thrust and the ship moved off the bank, floating free at 2126, maintaining the same list.

With the ship clear of the bank, the engine was put ahead and the forward tug instructed to tow ahead. The ship rounded the Hovel Pile beacon, at the eastern end of the South Channel, at 2200 and the tugs were released at 2213. The ship then continued its passage up Port Phillip Bay, to West Swanson Dock, where it was all fast by 0311 on Monday, 3 June.

Underwater inspection of the ship's hull indicated that no structural damage had occurred as a result of the grounding, only minor scraping of the paintwork.

Thorough testing of the steering gear system and the autopilot system by manufacturers' servicing agents while the ship was in Swanson Dock indicated that both systems were functioning normally.

Comment

During the passage through The Rip (Port Phillip Heads) and during the manoeuvre around to and through Schnapper Deep, Berlin Express reportedly responded and steered well in automatic pilot, giving no cause for concern. When, on passing buoys 11 and 12 at the western end of the dredged cut, the ship began to swing to starboard more rapidly than to be expected for a two degree course alteration, all those on the bridge - the Master, the Watch Officer, the Pilot and the Apprentice - responded immediately by ordering and/or carrying out remedial action. When it was realised that the stern might swing into the bank of the dredged cut, the engine control was put to stop and the rudder placed amidships. It is considered that in acting as they did, those on the bridge acted quickly and correctly, preventing damage to the rudder and propeller, but were unable to prevent the grounding.

When the auto-tiller was used to override the autopilot, the rudder responded immediately, going hard over to port. However, it is not known whether the amount of starboard rudder was being reduced under the autopilot before the auto-tiller was activated.

No fault was indicated by audio alarm, or by warning light, or was recorded by the data logger, to indicate a failure in either the steering motor system or the electronic autopilot.

Examination of the course and rudder angle recorder chart shows that the rudder moved to 20 degrees starboard at 1100, at the time of the rapid swing to starboard. It is, therefore, necessary to investigate possible causes for this to occur.

There are a number of possible causes:

- incorrect manual input,
- system malfunction,
- outside electrical interference.

Incorrect manual input

Alteration of course in the autopilot mode is by manual manipulation of the control knob, which has to be depressed and then rotated until the required course appears on the set course digital readout. One degree of course alteration requires about a 15-degree rotation of the knob, 10 degrees of course alteration requires a 180-degree rotation.

The Apprentice was manning the command station, executing the course alterations and adjustments after first repeating the Pilot's orders, monitored by the Watch Officer. He had performed this duty at the three previous ports and the Master considered him

competent in using the system. Had the Apprentice applied an input error, setting a course of 117 degrees instead of 107 degrees, the system would have applied 20 degrees of starboard, if not even hard to starboard, rudder. However, this would have required a rotation of the control knob of about 210 degrees instead of about 30 degrees. Both the Apprentice and the Watch Officer are adamant that this did not occur.

While human input error cannot be totally discounted, the statements of the members of the ship's staff directly involved do not support this as being the cause.

Momentary system failure

The steering motor system is operated by signals received from the autopilot. Rudder angle in excess of that signalled by the auto-pilot can only occur if there is a breakdown in signal transmission during a rudder movement, or if one of the solenoid valves fails to close, permitting the continued flow of hydraulic oil. The systems operated normally immediately port helm was applied and tested satisfactorily in Swanson Dock.

The service engineers considered it unlikely that one of the solenoids, as fitted on Berlin Express, would seize, even momentarily.

A random, momentary breakdown of an element/component in the autopilot control system is unlikely and would be difficult to trace, requiring a full systems check by the manufacturer.

The Autopilot and steering control were checked and tested by Anschutz technicians when the ship arrived back in Hamburg on 29 June 1993. No faults were found in the system.

It is considered unlikely that a momentary systems failure, either of the autopilot or the steering gear, occurred.

Outside electrical interference

The electrical control systems installed aboard Berlin Express are more sophisticated than those normally found on merchant ships, being more similar to those in aircraft. Aircraft control systems are liable to interference by radiation from electrical equipment, such as mobile telephones and lap-top computers, that may be on board the aircraft. The use of such equipment is either totally banned aboard aircraft, or strictly regulated. No such equipment was known to be in use adjacent to or on the bridge of Berlin Express, and the bulk carrier Ios, the only other "near source" of radiation, was not transmitting by radio at the relevant time.

It is, therefore, considered that electrical radiation interference of the electronic control systems from

an outside source is unlikely to have been a causal factor.

Analysis of course and rudder angle recorder chart

The time and course scales of the course recorder chart are small, 5mm representing 10 minutes, making detailed analysis difficult.

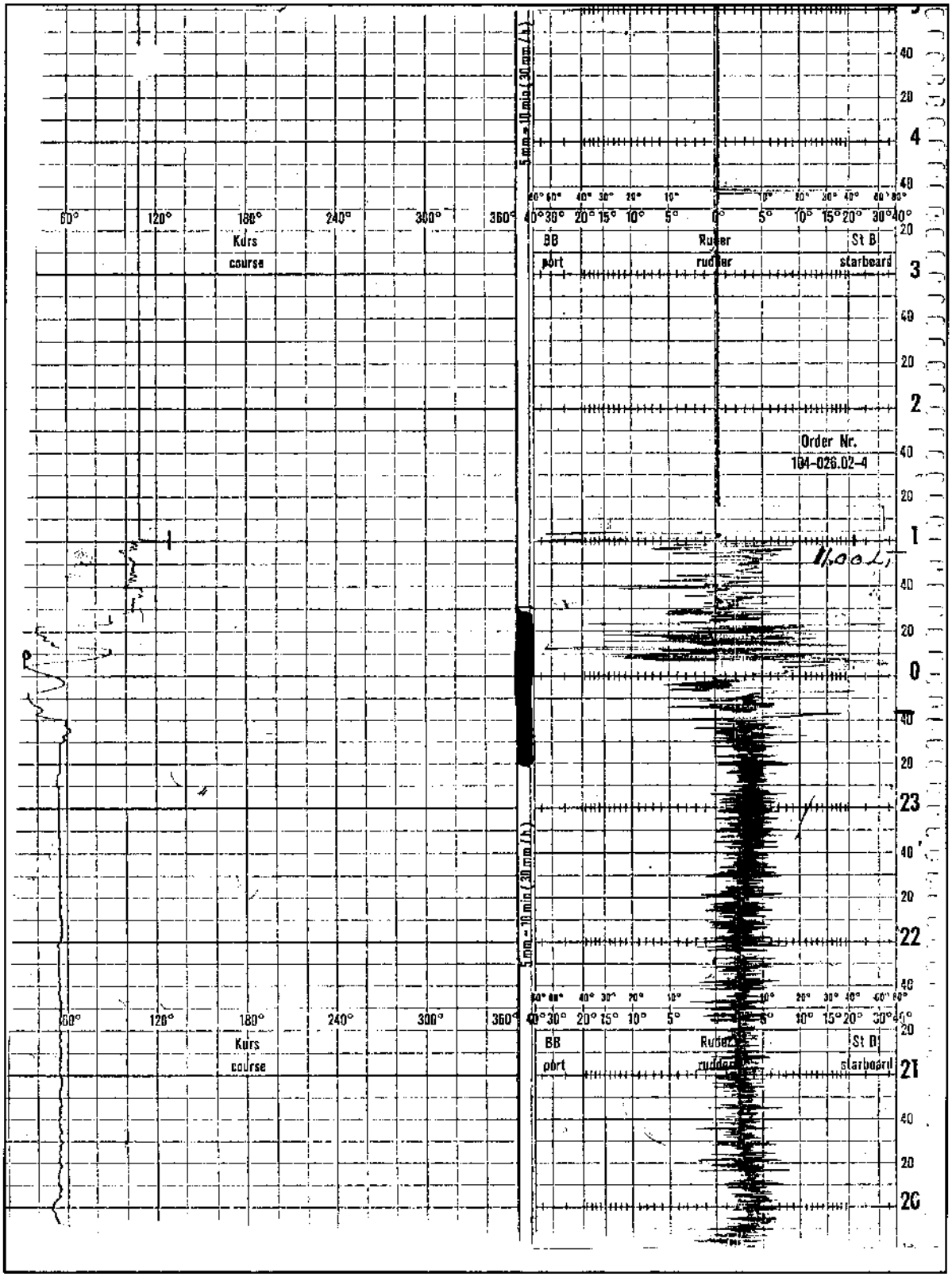
What is readily apparent is that from the time of the approach to the pilot boarding area, Berlin Express was carrying starboard helm of between 2.5 and 3.5 degrees. Also the zero, or midships, helm setting is slightly off to the right, or to starboard. There would also appear to be a time-setting error of between one and 1.5 minutes - according to the course recorder the ship steadied on a heading of 109 degrees at about 1101, whereas from the data logger, the time of ordering stop engine, shortly before the actual grounding, was 1102.

Assuming the ship to be steady on the correct heading, the course adjustment of two degrees to starboard would require the application of starboard helm. The amount of starboard helm to be applied is calculated by the autopilot, dependant on the settings of the various variable parameters (maximum rudder angle, rate and radius of turn, economy/precision steering). For a two-degree alteration, a maximum rudder movement of 10 degrees can be expected, unless the ship does not respond, in which case the computer will apply more rudder. After Berlin Express was brought on to the 105 degrees course from 096 degrees, to pass between buoys 11 and 12 and through the dredged cut, it yawed through about four degrees, a quite normal characteristic until such time as a ship has steadied on the new course. For the alteration and during the yawing, the autopilot applied about 8.5 degrees of starboard helm as against 7.5 degrees of port correction helm at the completion of the alteration and five degrees of port helm during the yawing.

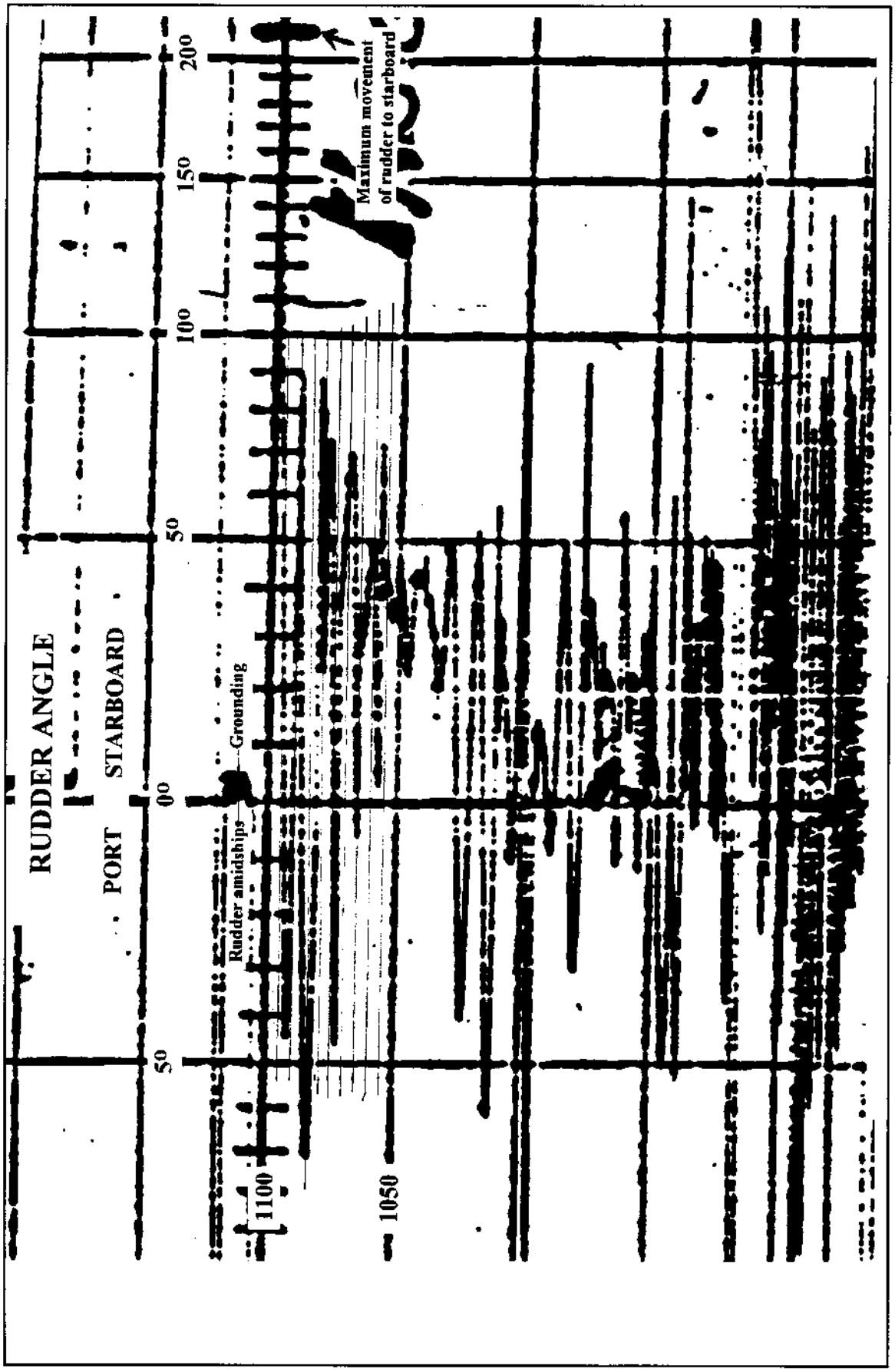
The movement of the rudder to starboard 20 degrees between 1058.5 and 1100, which created the rapid swing to starboard, appears to be in a continuous flow from a port five degrees position. The autopilot had applied port five degrees to bring the ship back to the correct heading from a heading of 108 degrees, following which the ship swung to port to a heading of 104 degrees.

If the course adjustment had not been made, it is reasonable to assume, bearing in mind that the ship was carrying about three degrees of starboard helm, that the autopilot would have applied about eight degrees of starboard corrective helm, to bring the ship back to the correct course.

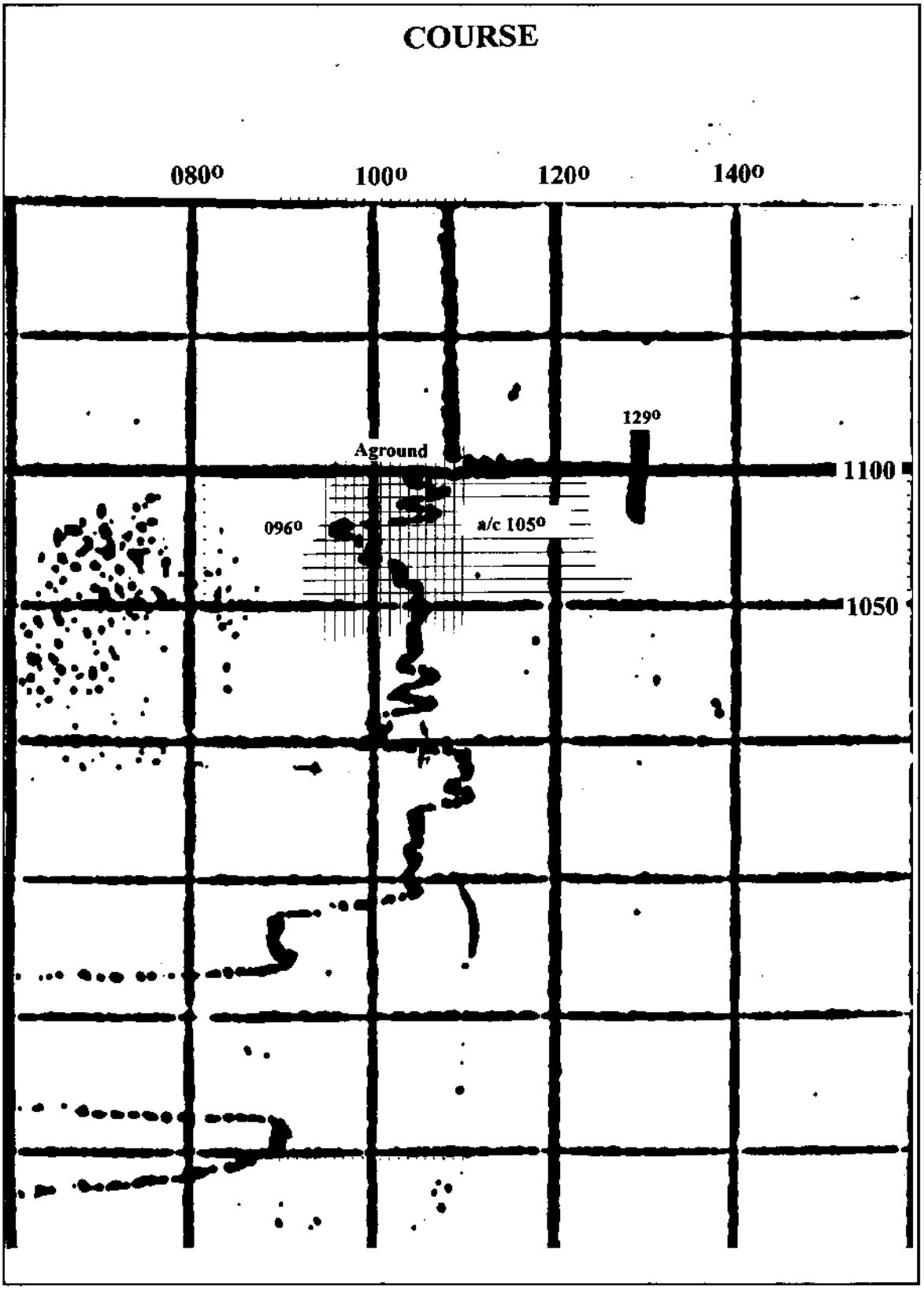
If the Apprentice made the course adjustment to 107 degrees as the



Section of Berlin Express course recorder chart



Enlargement of rudder angle section



Enlargement of course section

ship's head was swinging to port through a heading of 105 degrees, it is probable that the autopilot computer, analysing this movement away from the new command course, would direct more starboard rudder.

Whether this would have been as great as 20 degrees is difficult to determine. The increased rudder application would have initiated a rapid swing to starboard, but as soon as this commenced the amount of rudder should have been reduced by the autopilot. However, it is not possible to determine whether this in fact had started to happen when the Apprentice activated the auto-tiller.

Based on the above hypothesis, it is conceivable that no malfunction occurred, that it was the response of the autopilot, under the programmed settings, to that particular set of circumstances.

Hydrodynamic effects

The bulk carrier Ios cleared the dredged cut as Berlin Express passed No 9 buoy at 1058. Whether the water turbulence two minutes later, resulting from the passage of Ios, was sufficient to induce a sheer, accelerating the effect of the rudder movement, is difficult to determine. However, pilots have not reported experiencing any similar difficulties on other occasions.

Berlin Express had been proceeding at full manoeuvring speed of 15.5 knots, produced by an engine speed of 60 rpm with a 3 per cent allowance for slip. To maintain a speed of 15.5 knots against the ebbing tide, engine speed had been increased in stages to 73 rpm, providing a speed through the water of 18.5 knots (3 per cent slip).

From the bridge note book, the time of passing No 3 buoy was 1043 and the time of passing No 7 buoy was 1054. As the bridge clock does not have a second hand, the Master stated that the accuracy of these times is plus or minus one minute. Unless the minute hand only moves in one minute graduations, based on times being recorded to the nearest minute, the accuracy is considered to be plus or minus half a minute. The distance between buoys 3 and 7 is 3.7 miles, indicating a minimum speed over the ground for the ship of 18.5 knots.

The mid-channel dredged depth between buoys 11 and 12 is 15.7m, this depth slowly decreasing to 14.5m between buoys 13 and 14. The dredged depth also decreases away from the centre line, being 14m at a distance of 50m from the centre line. The height of tide at 1100 (at East Pile beacon) was +0.639m, providing an actual mid-channel water depth of 16.339m between buoys 11 and 12.

Using Dr C. B. Barrass's simplified formula for squat in

open water (block coefficient x still water speed squared x 0.01), Berlin Express would have experienced a maximum squat in the region of about 1.88m. Modifying this by the ratio draught/depth, used by both Doctors Turner and Tuck, reduces this to 1.19m, bringing the maximum draught to about 11.56m.

Thus on passing No 11 buoy, Berlin Express had a minimum underkeel clearance of about 4.78m, which would have been reduced to about 2.75m as the ship sheered to starboard.

The relatively small underkeel clearance as the ship closed the bank would have affected the ship's manoeuvrability, in that the ship would advance a greater distance in executing a manoeuvre. At the speed at which the ship was proceeding, combined with the shallow water effect on the manoeuvrability and possible hydrodynamic effect as the ship closed the bank, it is considered that, once the rapid swing to starboard began, grounding was unavoidable.

Speed

According to representatives of Port Phillip Sea Pilots Pty Ltd, the pilots do not reduce speed for passing through the dredged cut. Reportedly, since the cut was dredged to the current depth of 13.5m to 14.5m, no sheer problems, as a result of passing other ships or "bank effect", are experienced.

Regulation 339 of the Port of Melbourne Authority (Amendment) Regulations 1988, "Safe Speed South Channel Dredged Cut" states:

> "The master or pilot of a vessel navigating the South Channel dredged cut must cause the vessel to be navigated in the waters of the cut at the lowest speed consistent with safety."

In theory at least, this would indicate that ships should reduce to a speed compatible with maintaining steerage way and progress against the tide.

According to the Port of Melbourne Authority, regulation 339 was introduced when the dredged cut width was 250m and the dredged depth 12.5m, the purpose being to reduce squat and the effects of erosion caused by propeller wash. With the widening and deepening of the dredged cut, regulation 339 is no longer considered necessary, although it has not yet been repealed.

The speed at which Berlin Express was proceeding was in accordance with the practice of the port and would not appear to have been excessive for the depth of water available in the centre of the channel. However, had Berlin

Express been proceeding at a reduced speed, neither the swing nor the lateral movement to starboard would have been so great, with the result that the grounding would have been less likely to happen.

Manual/autopilot steering

Although the Master on board at the time was in the practice of using the autopilot during port operations, this practice was not followed by all the masters who had command of the ship.

Had the ship been steered in manual, when the Pilot ordered the course adjustment to 107 degrees, it is unlikely the Mechanic would have applied more helm than starboard 10, certainly not more than starboard 15.

If, as surmised, the starboard 20 degrees rudder was a natural function of the autopilot under those particular circumstances, or even if it was the result of an input error, the incident would most probably not have occurred had the steering been conducted manually.

Incident reconstruction by ship's staff

While on passage between Melbourne and Sydney, the Master and officers tried to recreate the situation as occurred before the grounding, carrying out the same course alteration and adjustment and creating, as near as possible, the same rudder movements during these manoeuvres. In their trials, the rudder movement to starboard 20 was not reproduced.

These trials were, of necessity, conducted in deep, open water and, therefore, were not truly representative of the incident in that they were not conducted in similar topographical and hydrographical conditions. They cannot, therefore, be considered as being in any way conclusive.

Advice from manufacturer's agent

Advice received from the Sydney office of Electrotech Marine Propriety Limited, Australia, servicing agents for Anschutz, is that operationally 20 degrees of starboard rudder could not have been applied by the autopilot.

Conclusions

Berlin Express grounded as a result of a rapid sheer to starboard brought about by the rudder moving to starboard 20 degrees.

It is considered that:

1 Although an autopilot human input error is the most straightforward and simplest explanation for the movement of the rudder to starboard 20 and cannot be totally discounted, such an error was unlikely.

2 A momentary systems failure, either of the autopilot or the steering gear, was unlikely.

3 Electrical radiation interference of the electronic control systems, from an outside source, was unlikely.

4 Possibly no conceivable malfunction occurred, instead the movement of the rudder to starboard 20 was the response of the autopilot, under the programmed settings, to that particular set of circumstances.

5 The speed of Berlin Express, on entering the cut, was around 18.5 knots

6 The effect of squat reduced the underkeel clearance as the ship passed between buoys 11 and 12 to 4.78m. As the ship sheered away from the centre line, this would have been reduced to about 2.75m, which would have had an adverse effect on the ship's manoeuvrability.

7 Those on the bridge acted quickly and correctly, but were unable to prevent the grounding.

8 At the speed at which Berlin Express was travelling, once the sheer commenced, grounding was unavoidable.

9 Although regulation 339 of the Port of Melbourne Authority (Amendment) Regulations 1988 is no longer considered appropriate, had Berlin Express been proceeding at a much reduced speed for passage through the dredged cut, the lateral movement to starboard would not have been so great and, therefore, the grounding would have been less likely to happen.

10 The movement of the rudder to starboard 20, the resultant sheer, and hence the grounding, would most probably not have occurred had the steering been conducted manually.

Submissions

Under the provisions of regulation 16 of the Navigation (Marine Casualty) Regulations, copies of the draft report were provided to the Master, Watch Officer and Apprentice of Berlin Express and to the Port Phillip Sea Pilot. Only the Port Phillip Sea Pilot responded, stating that he had no comment to make on either the factual matters, or the conclusion.

Details of ship

Name:	Berlin Express.
Lloyd's Number:	8704183
Flag:	German
Ship type:	container
Owner:	Hapag-Lloyd AG, Hamburg/Bremen
Crew:	17, German
Year of build:	1989
Yard:	Hudong Shipyard, Shanghai, PRC.
Gross tonnage:	35303
Nett tonnage:	16029
Summer deadweight:	42224
Length overall:	233.915m
Beam:	32.31m
Summer draught:	12.522m
Classification Society	Germanischer Lloyd