Holland+Knight

Tel 202 955 3000
Fax 202 955 5564

Holland & Knight LLP
Suite 100
2099 Pennsylvania Ave, NW
Washington, DC 20006-6801
http://www.hklaw.com

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The Law of E-Navigation

Dennis Bryant, Senior Counsel, Holland & Knight LLP

Background

Just slightly more than 83 years ago, on September 8, 1923, fourteen new destroyers of the US Navy were steaming south from San Francisco to their homeport of San Diego. During the voyage, the ships engaged in drills, including tactical and gunnery exercises. Late in the day, the squadron engaged in a 20-knot speed run, simulating wartime conditions. Running at this speed meant that the fathomers became inoperable. The ships therefore were relying almost exclusively on dead reckoning.

As the squadron approached Honda Point and the turn into the Santa Barbara Channel, the flagship (USS DELPHY) contacted the recently activated radio compass station at Point Arguello. A radio compass station receives a radio signal from the ship and then advises the ship via radio of the bearing from which the signal was received. The process, while better than nothing, was subject to a variety of faults, including calibration error, reciprocal bearing, transcription problems, and operator error. As a result, many experienced navigators of the day did not trust reports from these stations. The bearing received from the radio compass station was interpreted as placing the squadron further north than dead reckoning indicated. The squadron commander, Captain Edward H. Watson, placed his faith in dead reckoning and, at 2100, ordered the squadron to turn toward the southeast to enter the Santa Barbara Channel. The squadron immediately encountered a fog bank. Tragically, the order to commence the turn had been given about eight miles too early.

The squadron flagship, USS DELPHY, struck the rocks at Honda Point at 2105, while traveling at 20 knots. As it grounded, the ship sounded its siren, alerting the other ships of danger. The USS S. P. LEE was following several hundred feet astern. When it observed the sudden stopping of the flagship, it turned to port and grounded. The USS YOUNG took no evasive action and tore its bottom open on submerged rocks. The USS WOODBURY turned to starboard, but ran into an offshore rock. The USS NICHOLAS turned to port and grounded. The USS FARRAGUT grounded, but was able to extricate itself. The USS FULLER grounded alongside the WOODBURY. The USS PERCIVAL and the USS SOMERS were lightly damaged. The USS CHAUNCEY attempted to rescue sailors from the capsized YOUNG and grounded itself. The remaining four destroyers at the rear of the squadron escaped without

Dennis L. Bryant **Direct Line - (202) 828-1865**
E-mail **dennis.bryant@hklaw.com**
Maritime Spotlight **http://www.hklaw.com/Publications/Spotlight.asp?group=480**

damage. Seven of the ships were total losses and left on the rocks (DELPHY, S. P. LEE, YOUNG, WOODBURY, NICHOLAS, FULLER, and CHAUNCEY). Twenty-three sailors died (20 in the YOUNG and 3 in the DELPHY). Captain Watson was court-martialed and accepted responsibility for the tragedy.

The Honda Point grounding remains to this day the single greatest maritime casualty involving electronic navigation.

Let me quote a passage from the Ninth Edition of Dutton's Navigation and Nautical Astronomy (1948):

> The expression *electronic navigation* has not appeared in previous editions of this text, nor in any but recent publications. Although radio equipment has been used by the navigator for many years, it was not until the development of radar, loran, and other such aids to navigation during World War II that electronic navigation was recognized as a separate division of navigation. Now it is considered a very important branch and may easily fulfill the predictions of those who confidently expect it to become the primary navigational method. However, even the most enthusiastic supporters of this newest form of navigation recognize that it has limitations and that it will probably never render other methods obsolete any more than the gyro compass, valuable as it is, has caused the magnetic compass to be discarded. Keep constantly in mind that the methods discussed in this chapter are navigational *aids* and that it is still important to know how to use other methods.[1]

Current practices

We now have the global positioning system (GPS), the automatic identification system (AIS), and other technologies that weren't even considered possible in 1948. How much have we learned and how much have we put into practice? Some indications that the lessons of Honda Point have not yet been fully put into practice follow.

On June 10, 1995, the cruise ship ROYAL MAJESTY grounded on Rose and Crown Shoal near Nantucket Island. The ship was fitted with GPS, LORAN-C, radar, fathometer, and other navigation equipment. It was returning to Boston from a voyage to Bermuda. At dinner that night, the master had commented to passengers dining at his table how safe the ship was with GPS due to its high level of accuracy. When the ship grounded at about 2225 that night, it was approximately 17 miles west of where the watch officers thought it was immediately prior to the grounding. The watch officers had been relying exclusively on the GPS readout to determine the position of the ship. The GPS receiver was located in the chartroom, but the readout was available on the bridge. Unfortunately, the antenna wire had come loose from the back of the

[1] Dutton's Navigation and Nautical Astronomy, page 183, United States Naval Institute, Annapolis, Maryland (Ninth Edition, 1948, revised by LCDR Alton B. Moody, USNR).

GPS receiver. The device was designed to default to automatic dead-reckoning when it did not receive a signal from the GPS satellites. It was also designed to display a flashing light when it was utilizing dead-reckoning. The flashing light did not display on the remote readout on the bridge, but only on the receiver itself. The watch officers had become so confident in the GPS that they did not check the LORAN-C, the radar, or the fathometer, all of which would have alerted them that the ship was standing into danger. The grounding was due, in large part, to the complacency of the watch officers in relying exclusively on one electronic aid to navigation.[2]

On December 15, 1998, the cruise ship MONARCH OF THE SEAS grounded on Proselyte Reef, in Great Bay, Philipsburg, St. Maarten, Netherlands Antilles. The ship was fitted with radar, ARPA, and GPS, in addition to other navigational equipment. The master brought the ship into Philipsburg on an unscheduled call because an ill passenger needed medical treatment ashore. After the passenger had been put ashore, the master decided on a return to sea via the most direct route. The chart for this port had not been kept up to date, so a recent relocation of a vital buoy was not reflected thereon. The course was selected by the master's mariner eye, with minimal use of any of the electronic navigation equipment onboard. The ship promptly grounded on the charted reef, resulting in severe damage to the ship.[3]

On 8 April 2005, the German container ship WASHINGTON SENATOR was south-bound through the Taiwan Straits. The UK container ship LYKES VOYAGER was north-bound in the Straits. There were a number of ocean-going ships and fishing vessels operating in these waters. It was foggy, with visibility reduced to about 200 meters. When the master of the WASHINGTON SENATOR observed on radar that he would have a very close passing with the ship coming at him, he called on the VHF radio and made passing arrangements. Unfortunately, the ship that he contacted on the radio was not the LYKES VOYAGER, which was the ship he meant to call and which was closing rapidly. He made his course change per the passing agreement. The LYKES VOYAGER did not react as he expected and a collision ensued. Both ships were equipped with AIS, which, if consulted, would have revealed the identity of the other ship. The collision was due in large part to the failure to utilize installed navigation equipment.[4]

On 10 October 2005, the British general cargo vessel LERRIX grounded off the Darss peninsula in the Baltic Sea. The master was on watch. He allowed the lookout to go below and subsequently fell asleep in the bridge chair. The ship grounded after missing a course change.

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[2] National Transportation Safety Board, Marine Accident Report 97/01 – Grounding of the Panamanian Passenger Ship ROYAL MAGESTY on Rose and Crown Shoal near Nantucket, Massachusetts, June 10, 1995.

[3] Joint Investigation – Maritime Investigator of Norway & US Coast Guard, Report of Investigation into the Circumstances Surrounding the Grounding of the MONARCH OF THE SEAS on Proselyte Reef in Great Bay, Philipsburg, St. Maarten, Netherlands Antilles on December 15, 1998 resulting in major vessel damage, no loss of life and minor pollution (10 April 2003).

[4] Joint Investigation – German Federal Bureau of Maritime Casualty Investigation & UK Marine Accident Investigation Branch – Report No. 4/2006 (February 2006), Report on the investigation of the collision between Lykes Voyager and Washington Senator, Taiwan Strait, 8 April 2005.

The watch alarm, which probably would have awoken the master before the ship grounded, was found to be inoperative. During the investigation, it emerged that the master was using a portable GPS connected to a personal laptop computer, running a pirated navigation package as his primary source of navigation information. The pirated program, obtained off the internet in 1999, had not been updated and the alarm functions were inoperative. While fatigue was the major factor in the casualty, the inoperative watch alarm and the misuse of an unapproved electronic navigation program were significant contributors.[5]

On 5 January 2006, the British container vessel BERIT grounded on the Trindelen Bank off Gedser in the Baltic Sea. The ship was fitted with an electronic charting system, but investigation following the grounding revealed that the officers did not employ the full functionality. With no depth or "no go" areas, cross track error, or waypoint alarms set, the system was essentially passive. In this incident, the second mate allowed the lookout to go below. The second mate then became distracted, initially by the VHF radio and subsequently by sending text messages using his mobile telephone. While distracted, he missed a planned course alteration and the ship grounded 32 minutes later. In other words, the owner provided the ship with the appropriate equipment, but then did not check to determine whether it was being used to best effect.[6]

Litigated cases

Radio and radiotelephone

Failure to equip a coastwise tug with radio receiving sets to receive storm warnings renders the tug unseaworthy, precluding limitation of liability by the owner.[7] A defective channel 13 transmitter on a ship renders such ship unseaworthy.[8] Failure to maintain a proper listening watch on the ship's bridge-to-bridge radiotelephone while underway constitutes negligence.[9] Failure of ship that was anchored in a hazardous locale during conditions of heavy fog to issue

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[5] UK Marine Accident Investigation Branch – Report No. 14/2006 (April 2006), Report on the investigation into the grounding of MV Lerrix off the Darss peninsular, Baltic Sea, Germany, 10 September 2005.

[6] UK Marine Accident Investigation Branch – Report No. 17/2006 (July 2006), Report on the investigation of the grounding of Berit, Trindelen Bank, near Gedser, Denmark, 5 January 2006.

[7] The T. J. Hooper, 60 F.2d 737 (2nd Cir. 1932), cert. denied, Eastern Transportation Co. v. Northern Barge Corp., 287 U.S 662 (1932). "[A] whole calling may have unduly lagged in the adoption of new and available devices. It may never set its own tests, however persuasive be its usages. Courts must in the end say what is required; there are precautions so imperative that even their universal disregard will not excuse their omission." 60 F.2d at 740.

[8] Hogge v. SS Yorkmar, 434 F.Supp. 715 (D. Md. 1977).

[9] Allied Chemical Corp. v. Hess Tankship Co. of Del., 661 F.2d 1044 (5th Cir. 1981); Hogge v. SS Yorkmar, 434 F.Supp. 715 (D. Md. 1977).

additional security calls after giving one such call immediately after anchoring was a contributing cause to the subsequent collision.[10]

Fathometer

It is negligent of a master on a ship equipped with a fathometer to fail to utilize that device while navigating in a ship canal during a period of reduced visibility.[11]

Radar

Failure to properly utilize the ship's radar and to plot nearby contacts constitutes negligence.[12] Proper utilization of radar includes taking the bearings and distances of approaching vessels at regular intervals and carefully evaluating that information by plotting or by some equivalent systematic method.[13] Interference between two radars on a ship is a not uncommon occurrence and is a correctable condition. It is negligent of the owners to allow a ship to proceed to sea without correcting this problem if they knew of it or should have known of it.[14] It is negligent of a ship owner to expect that a master will learn how to utilize the automatic radar plotting aids (ARPA) system merely by seeing that system used once on another ship and having the manufacturer's manual placed on the bridge of the ship.[15]

Rising legal issues

Government agencies and private litigants, as the opportunity arises, make use of the data retained by electronic navigation devices to determine the cause of marine casualties and assign liabilities. Agencies such as the US Coast Guard and the UK Marine Accident Investigation Branch (MAIB) are reviewing voyage data recorders (VDR), for example, to resolve issues

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[10] Getty Oil (Eastern Operations) v. SS Ponce de Leon, 409 F.Supp. 909 (S.D.N.Y. 1976), aff'd, 555 F.2d 328 (2nd Cir. 1977).

[11] Pennzoil Producing Co. v. Offshore Exp., Inc., 943 F.2d 1465 (5th Cir. 1991). In this case, the vessel allided with a submerged natural gas line outside the marked and dredged waterway. Evidence indicated that the owner knew that its masters frequently failed to use the fathometer. The owner was not allowed to limit its liability.

[12] Afran Transport Co. v. The Bergechief, 274 F.2d 469 (2nd Cir. 1960), where the court noted an emerging duty to carry and utilize radar. See also, Getty Oil (Eastern Operations) v. SS Ponce de Leon, 409 F.Supp. 909 (S.D.N.Y. 1976), aff'd, 555 F.2d 328 (2nd Cir. 1977); Polarus Steamship Co. v. T/S Sandefjord, 236 F.2d 270 (2nd Cir. 1956), cert. denied, Viriks Rederi v. Polarus S.S. Co., 352 U.S. 982 (1957).

[13] Hellenic Lines, Ltd. v. Prudential Lines, Inc., 730 F.2d 159 (4th Cir. 1984), holding that parallel indexing does not constitute an equivalent systematic observation. See also, Hellenic Lines, Ltd. v. Prudential Lines, Inc., 813 F.2d 634 (4th Cir. 1987).

[14] Complaint of Hercules Carriers, Inc., 566 F.Supp. 962 (M.D. Fla. 1983).

[15] In the Matter of the Complaint of Waterstand Marine, Ltd., 1991 A.M.C. 1784 (E.D. Pa. 1988), affirmed without discussion, 862 F.2d 311 (3rd Cir. 1988).

related to vessel movements and actions immediately preceding collisions and groundings. The International Maritime Organization (IMO) recently published a circular entitled *Recommended means for extracting stored data from voyage data recorders (VDRs) and simplified voyage data recorders (S-VDRs) for investigation authorities*.[16] Copies of VDR material are now regularly sought in civil litigation in maritime cases.

The UK Department for Transport recently announced plans to utilize records of AIS transmissions in actions regarding navigation safety (rules of the road violations, etc.) and pollution response.[17] It is only a matter of time before Long Range Identification and Tracking (LRIT) is utilized for the same basic purposes.[18]

Data from global positioning system (GPS) receivers on go-fast boats and other small craft are regularly used in criminal prosecutions to prove that defendants were smuggling drugs into the United States.[19]

Conclusion

Owners and operators of ships are expected to equip those ships not only with all the required electronic navigation devices, but also with those devices that are generally available, even if not required by law or regulation. If IMO standards have been developed for a navigation device, the owner or operator is expected to have selected a device that meets the applicable standard. The navigation device must be installed properly and placed in a location and a manner that is reasonably useful for the average mariner (ergonomics). The navigation device must be properly maintained and remain reasonably operable. The personnel who are expected to utilize the navigation device must be trained and reasonably proficient in its use. Finally, the owner and operator must regularly check to ensure that the navigation devices installed are actually being used by the personnel charged with properly navigating the ship.

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[16] SN.Circ.246 dated 17 June 2005.

[17] UK Department for Transport, Government Strategy for AIS , page 8 (23 March 2006). "AIS data has the potential to be used as an enforcement tool both for monitoring of events occurring in 'real-time' – such as vessels in breach of the ColRegs – and for tracing potential polluters via replayed data, along with assisting in other enforcement related investigations. It may also have an impact on some civil litigation disputes."

[18] *Ibid*. page 6 – "Ahead of LRIT, scene of action coordinator to be able to transmit local picture back to MRCC via satellite."

[19] See, United States v. Perlaza, 439 F.3d 1149 (9th Cir. 2006), conviction reversed on other grounds. See also, Wyoming v. Livingston, 443 F.3d 1211 (10th Cir. 2006), where the State of Wyoming attempted to prosecute officers of the US Fish and Wildlife Service for trespass and littering while engaged in a program to introduce and control gray wolves. The State relied primarily on GPS data from the government contractor's airplane to demonstrate the trespass. The federal court ultimately dismissed the action under the Supremacy Clause of the US Constitution.

It is only appropriate that this survey of legal issues related to electronic navigation end where it began – with reference to the 1923 Honda Point disaster. The following is taken from the records of the US Navy court of inquiry, but has continuing validity:

> After considering carefully the testimony adduced the court finds nothing which reflects on the efficiency of the radio compass installation. A mass of confusing testimony has been brought forward to prove that bearings may not be relied upon, but out of this testimony shines the clear fact that it was not the compass bearings sent to the *Delphy*, which were wrong, but the judgment of the men who interpreted these bearings and used them wrongly.
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> Dead reckoning alone can never be relied upon.
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> In commenting upon the record of the court of inquiry, the Chief of the Bureau of Engineering said: "The Bureau desires to emphasize the fact that such devices as radio compasses, sonic depth finders, etc., are reliable only to the extent that they are operated properly, and recommends that the attention of the forces afloat be directed to the necessity for continuous training in their use." With this remark the Bureau of Navigation concurred.[20]

[20] US Navy Court of Inquiry, Memorandum concerning the Honda Point Disaster (15 October 1931).