National Transportation Safety Board

Marine Accident Brief

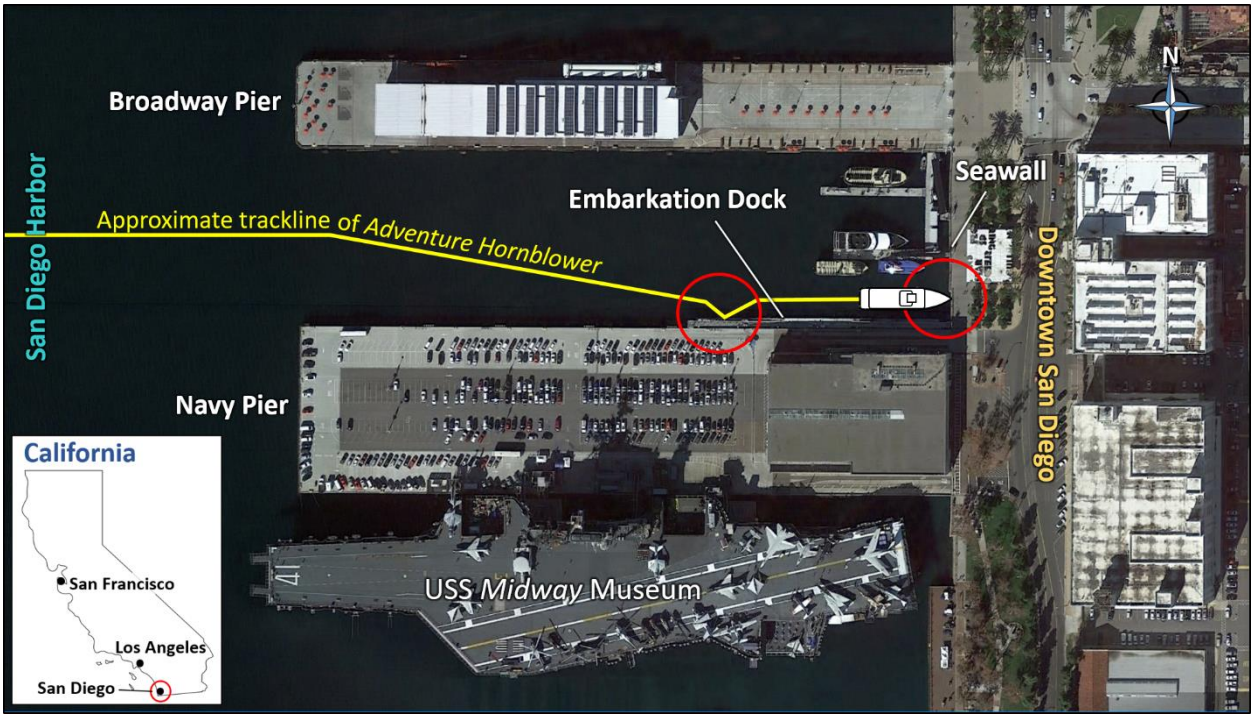
Allision of Passenger Vessel *Adventure Hornblower* with San Diego Seawall

Accident no.	DCA16FM035
Vessel name	*Adventure Hornblower*
Accident type	Allision
Location	Navy Pier, San Diego Bay, California, 32° 42.9' N, 117° 10.4' W
Date	March 31, 2016
Time	1255 Pacific daylight time (coordinated universal time − 7 hours)
Injuries	Several minor passenger injuries
Damage	Pier damage $715,000 est., vessel damage over $344,000
Environmental damage	None reported
Weather	Clear visibility, little to no wind, calm seas, air temperature 64°F
Waterway information	San Diego Bay is a crescent-shaped bay located 10 miles northwest of the US/Mexico border. The port of San Diego, which occupies much of the bay, hosts a major US Navy base and has numerous commercial marine facilities.[1]

On the afternoon of March 31, 2016, the passenger vessel *Adventure Hornblower* was attempting to dock at the Navy Pier in downtown San Diego, California, following a whale-watching excursion. As the vessel made its approach to the pier, its bow unexpectedly swung to starboard and allided with the pier's passenger embarkation dock. The *Adventure Hornblower* then accelerated forward until it struck the seawall at the foot of the pier. Eight passengers sustained minor injuries in the accident. The allision caused nearly $1.06 million in damage to the vessel, pier, and seawall.

Passenger vessel *Adventure Hornblower.* (Photo provided by US Coast Guard)

[1] National Oceanic and Atmospheric Administration (NOAA), *United States Coast Pilot 7*, Washington, DC: US Department of Commerce, 2017.



Accident location, San Diego, California. (Background by Google Earth Pro)

The 143-foot, 94-ton *Adventure Hornblower*, originally named the *Emerald Empress*, was built by Washburn & Doughty Associates, Inc. in East Boothbay, Maine, and delivered to Hornblower Marine on May 12, 1994. Operated by Hornblower Cruises & Events, the vessel conducted harbor cruises and whale-watching trips in San Diego Bay and the surrounding coastal waters of the Pacific Ocean. According to the vessel's certificate of inspection, issued on March 28, 2013, the vessel was permitted to carry 490 passengers between the months of March and December.

The vessel had three decks for passengers: a fully enclosed lower deck, a partially enclosed middle deck, and an open "sun deck" on the upper level. The vessel's wheelhouse was located on the forward end of the sun deck. Steering, engine speed, and thrust direction could be controlled from three locations: the wheelhouse and wing stations on either side of the wheelhouse. The *Adventure Hornblower*'s main propulsion was provided by two fixed-pitch propellers, each powered by a direct-coupled diesel engine. Each engine had a transmission that coupled the engine driveshaft to the propeller shaft in either the forward or astern (reverse) direction, or decoupled the engine for neutral. Integrated dual throttles at the wheelhouse and wing stations controlled both the engine rpm and propeller direction. The vessel was equipped with one bow thruster to provide lateral control forward. The bow thruster could be controlled from each of the maneuvering stations. The vessel was also outfitted with an automatic identification system (AIS).[2]

[2] *AIS* is a maritime navigation safety communications system. At 2- to 12-second intervals on a moving vessel, the AIS automatically transmits vessel information, including the vessel's name, type, position, course, speed, navigational status, and other safety-related information, to appropriately equipped shore stations, other vessels, and aircraft. The rate at which the AIS information is updated depends on vessel speed and whether the vessel is changing course. AIS also automatically receives information from similarly equipped vessels.

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Accident Events

On the day of the accident, the vessel had five crewmembers; a captain, a first officer, two deckhands/snackbar attendants, and a photographer. The captain had about 10 years' experience in the fishing and tour boat industries and held a merchant marine credential, issued in 2012, as master of near-coastal self-propelled vessels of less than 100 tons. She had been employed as a captain with Hornblower Cruises & Events for about a year and a half. She told investigators that she had been mooring the vessel at the Navy Pier throughout her tenure with the company and felt comfortable doing so.

About 0600 on the morning of the accident, a company shore-based assistant engineer boarded the *Adventure Hornblower* at San Diego's Grape Street Pier—the vessel's home pier—to conduct daily general checks of the vessel's navigation, propulsion, and auxiliary systems. While conducting the checks, the engineer filled out a daily checklist for the captain to review. He departed the vessel before the captain arrived about 0800.

Since November 2015, the vessel's port main engine transmission had been leaking hydraulic oil, requiring replenishment of 1.5–2 gallons of oil each day into the 19-gallon-capacity sump. The maintenance director verified the source of the leak and ordered a new gasket kit to correct the leak in January 2016. The kit was received the same month, but had not yet been installed when the accident occurred. In late February 2016, pans were placed under the equipment to collect the leaking oil. Although this was a widely known maintenance issue, it was not regularly noted in the daily checklists, including the checklist left for the captain on the morning of the accident. The captain and first officer later told investigators that they were aware of the leak.

When the captain arrived on board, she reviewed the engineering checklist and conducted pre-underway checks. The captain told investigators that once the rest of the crew arrived she started the engines and tested control of propulsion and steering from the wheelhouse and the port wing station. Following a satisfactory test, the vessel got under way en route to the embarkation dock at the Navy Pier, about a half mile away, to pick up passengers for the morning whale-watching excursion. As the *Adventure Hornblower* approached the Navy Pier, the captain switched control to the starboard wing station and tested the controls. The controls tested satisfactorily, and the vessel docked at the Navy Pier without any problems.

The *Adventure Hornblower* embarked 144 passengers and departed for the whale-watching tour just after 0930. As the vessel was getting under way, the captain conducted a routine safety briefing over the public-address system. The vessel proceeded out of San Diego Bay to about 12 miles offshore in the Pacific Ocean, searching for and observing sea life. The vessel then began transiting inbound to San Diego about 1130. During the entire voyage, the *Adventure Hornblower* first officer made three inspection tours of the engine room, each spaced about an hour apart. She stated that engine room checks included a visual check of the condition of equipment and bilges. She said that she also used her sense of smell to detect anything unusual. The first officer noted no problems in the engine room during these checks, and the vessel experienced no issues with the propulsion systems throughout the outbound and inbound transits.

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About 1245, the *Adventure Hornblower* began its approach to the embarkation dock at the Navy Pier. The captain, who had been in the wheelhouse, put the engine controls in neutral and slowed the vessel. She then moved to the starboard wing station in preparation for docking. When she reached the wing station, she had to ask passengers standing near the control box to move out of the way. The captain lifted the protective cover from the control box and shifted engine controls from the wheelhouse to the wing station by pressing the station select button on the dual-lever analog control head. An amber LED light on the controller illuminated, indicating that the control station was in command. The captain also shifted control of the bow thruster to the starboard wing station in a similar manner. She then tested engine control by moving the throttles into the forward and astern positions until the transmission engaged. She also tested steering and bow thruster control, noting no issues.

Starboard wing station control box.

The captain told investigators that her normal docking procedure was to approach the pier at a very slow speed, moving the throttles from neutral to forward to neutral again as needed to maintain steerageway. Once the vessel was about 10 feet from the final mooring position, a spring line was passed to linehandlers on the pier.[3] The captain would then shift the port engine into reverse to bring the stern toward the dock and allow the linehandlers to prepare the stern line. If necessary, the captain would use the bow thruster to bring the bow toward the pier so that the bow line could be made up.

On the morning of the accident, the captain made her normal approach, "bumping" the throttles forward and then moving them back to neutral as the vessel closed the pier. She estimated that the vessel's speed was about 2 knots as it lined up in the "fairway," which the crew defined as the area between the Navy Pier and the Broadway Pier. At some point during the approach to the embarkation dock, the port transmission did not respond to the command to return to neutral, but stayed in the forward position. When the captain moved the port throttle to the astern position to bring the stern toward the dock, the transmission remained in the forward position.

There was no indicator at the wing station to show the position of the transmission, and thus the captain did not know if it was in the ahead, neutral, or astern position. Because the vessel did not move in reverse when she ordered astern propulsion, she increased the throttle thinking that she did not have enough power for the maneuver. With the transmission stuck in the ahead position, this order had the opposite of the intended effect. The *Adventure Hornblower* surged forward and the bow swung into the pier. At 1255, the starboard bow of the vessel allided with the

[3] A spring line is a mooring line that runs at an angle from the vessel to the pier to prevent forward and aft movement. During docking maneuvers, a spring line may be passed to the pier to allow the operator to use the rudders and engines to control lateral movement of the vessel while keeping it in the same relative fore-and-aft position along the pier.

embarkation dock at the Navy Pier. The vessel then rebounded away from the pier and continued moving forward.

As the *Adventure Hornblower* moved forward, the captain put both throttles in the full astern position, still unaware that the port engine was engaged in the ahead position. Because the vessel's propellers operated more efficiently in forward than in reverse, the starboard engine operating astern was overpowered by the port engine operating forward, and the vessel began to accelerate ahead toward the seawall at the foot of the pier.

Across the slip from the embarkation dock, the passenger ferry *Cabrillo* was moored at a floating pier. The *Cabrillo* captain witnessed the *Adventure Hornblower*'s advance and immediately sounded five short blasts on the *Cabrillo*'s whistle to warn people on the pier and nearby vessels. The *Adventure Hornblower* continued accelerating forward until it hit the seawall at about 6 knots, narrowly missing several pedestrians that were lined up along the wall waiting to embark another vessel.

***Adventure Hornblower* after alliding with the San Diego seawall. (Photo by Coast Guard)**

As the *Adventure Hornblower* struck the wall or shortly thereafter, the captain shut down both engines to prevent further movement. She reported the accident to the Coast Guard via VHF radio, then went below to ensure the vessel was not taking on water. Meanwhile, the first officer and the snack bar attendants administered aid to injured passengers. Minutes later, emergency medical services (EMS) personnel arrived on scene. A line was passed to the *Adventure Hornblower* and the stern was pulled toward the pier to allow first responders to board through a cargo door on the lower passenger deck. Of the 144 passengers on board, 3 were taken to the hospital and 5 additional passengers reported injuries but declined treatment immediately following the accident. All injuries were considered minor, including cuts, scrapes, bruises, and sprains.

About an hour after the allision, Coast Guard officials determined that the *Adventure Hornblower* could be safely moved from the seawall. The vessel was moved by tugboat to the embarkation pier to offload passengers. Damage to the pier as a result of the accident was estimated at $715,000, while damage to the *Adventure Hornblower* totaled over $344,000.

All five crewmembers were tested for alcohol and other drugs. All results were negative.

Analysis

Prior to the postaccident investigation, company personnel and third-party technicians boarded the *Adventure Hornblower* and conducted testing and a machinery space wipe-down without the consent of the investigative team. Additionally, the vessel's AIS was not activated on the day of the accident. A review of the AIS data indicated that the last recorded position was at 1728 the previous day while the vessel was under way en route to the Grape Street Pier. (AIS is required to be activated at all times while the vessel is under way or at anchor, and, if moored, at least 15 minutes prior to getting under way.) These factors hindered the preliminary on-scene phase of the investigation by impacting the preservation of perishable evidence, documentation, and post-casualty analysis.

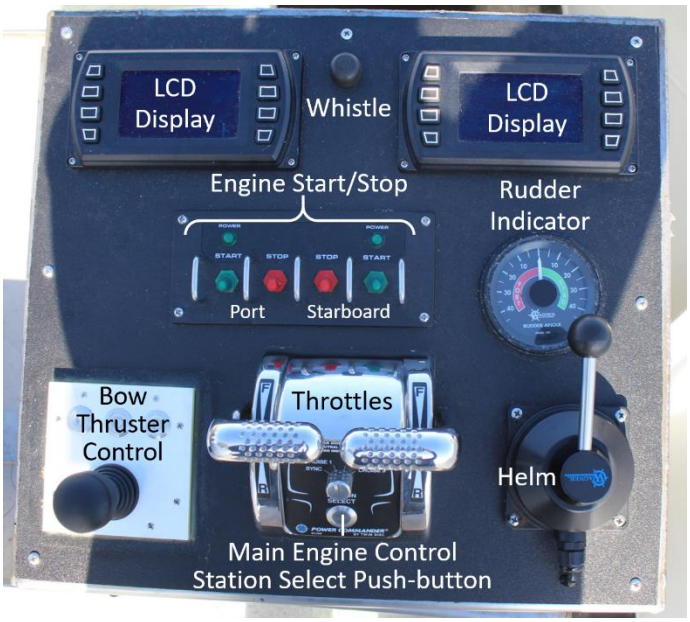
While the *Adventure Hornblower* was pierside in San Diego, investigators reviewed available documentation, certificates, and records and examined the machinery spaces and transmissions. On initial observation, investigators found a leak pan with hydraulic oil located under the port engine, as noted above, plus additional new drip pans in the engine room. Following the on-scene investigation, the Coast Guard and the equipment manufacturers tested the vessel's transmission and control systems.

Control Station Access and Design

The control boxes at the wing stations were covered when not in use; however, passengers were permitted to walk or stand in the vicinity of the stations. When the captain reached the starboard wing station, she had to ask passengers to move out of the way so that she could access the box. This passenger interference had the potential to introduce distraction for the crew of the *Adventure Hornblower* when attempting to access the control box. Although not a factor in the accident, allowing passengers in this area also created an environment whereby a passenger could have tampered with, or unintentionally bumped into, the vessel's controls.

In addition to the potential for passenger interference with the port and starboard wing stations, the design of the stations did not provide the operator with an alarm or the necessary information to determine if the controls were responding appropriately. From where the captain was standing at the wing station, she had no information as to whether her throttle command corresponded to the direction of travel. The wing stations and wheelhouse were also not designed nor required to have instrumentation that provided positive indication of thrust direction to the operator. An indicator would have increased the likelihood of early detection of improper propulsion response and permitted prompt action. A "wrong way" indicator or deviation alarm was also not required based on regulations under which the vessel was operating at the time of the incident. Deviation alarms audibly and visually alert operators in the shortest possible time should the propeller not respond to a command. Steering and propulsion are vital systems on a vessel, and, as such, should have alarms at remote propulsion control stations that clearly notify the operator in the event of a critical failure. In the last 10 years, the NTSB investigated two other

accidents where lack of an alarm indicating a propulsion system failure contributed to significant damage and serious injuries. Title 46 *Code of Federal Regulations* (*CFR*) Part 121.620 provides propulsion engine control system requirements for passenger vessels like the *Adventure Hornblower*. The Coast Guard has received numerous requests from industry for further guidance on these regulations, and interpretation of the regulations is not applied uniformly across the industry.[4]



Close-up of wing station controls.

The captain told investigators that there were no alarms on the starboard wing station. The LCD displays at the wing station provided only engine information. No alarm or fault codes were recorded by the Twin Disc EC300 control system during the accident indicating an actuator failure. The only actuator fault code that the system was designed to provide was an overcurrent failure. However, even if that fault condition existed, it would have provided only a visual indication—the neutral position indicator LED would have flashed on the control when the lever was in neutral position. No audible alarm would have sounded at the station. The first officer was not required to be in the wheelhouse during docking maneuvers, so any alarm at that location would have gone unnoticed. The captain stated, "You don't know that anything's wrong until . . . it's already wrong." Given the vessel's speed and distance to the wall, the captain may not have been able to prevent the accident had she been aware that there was a problem, but she may have been able to stop the port engine earlier, thus reducing the speed and consequently the damage that the vessel and seawall sustained.

Control System

Company representatives told investigators that between October 2013 and November 2014 the *Adventure Hornblower* experienced three engine control failures. Also, a review of the Coast Guard's Marine Information for Safety and Law Enforcement (MISLE) system revealed that a casualty similar to the accident under investigation occurred in October 2014. The *Adventure Hornblower* struck two stationary vessels and the wooden docks adjacent to the Broadway Pier, with the captain indicating that the engines failed to respond to helm orders. The cause of that failure was determined to be misalignment of the starboard engine's transmission shift cable. The length of travel (stroke) of the cable was short of full operation. A service

[4] Title 46 *CFR* Subchapter K Part 121.620 (d) requires passenger vessels with microprocessor or computer-based propulsion engine control systems to meet the requirements of Title 46 *CFR* Part 62, including "shaft speed and thrust direction indicators for each independent propeller controlled."

technician replaced the port and starboard transmission shift cables and corrected the alignment and travel on both.

At that time, the company decided to replace the wheelhouse and wing station throttle controls with a new Twin Disc EC300 control system. After installation, management required the vessel's captains to be trained on these new systems. The training included how to approach and depart the various piers, how to transfer control between stations, and where and when the captain and first officer were to stand while maneuvering during the approach to and departure from the dock. Additional operational guidance was included in a 4-page training instruction and sign-off sheet. The *Adventure Hornblower* captain received the training on November 22, 2014.

Maneuvering commands from the wheelhouse and wing station throttle controls were transmitted electrically to the EC300 control module in the engine room, which then sent command signals to the main engines and transmissions. Transmission signals were routed to an electric-motor-driven actuator, called a servo-actuator. The servo-actuator was linked to the transmission's control unit selector lever via a shift (push-pull) cable.

During the initial examination of the vessel, investigators tested the controls at the wheelhouse and port wing stations and both operated satisfactorily. There were no alarm or fault codes recorded in the control module after the accident. In June 2016, the Twin Disc system was removed from the vessel and further tested at the manufacturer's laboratory in Racine, Wisconsin. The system's servo-actuator electric motor, sourced from Globe Motors Inc., was found to have a high resistance that may have caused the motor to shut down. Further testing of the motor at the Globe Motors facility in Dothan, Alabama, showed higher than normal electrical resistance and impedance readings when the gear was turned manually, but otherwise the unit passed the manufacturer's normal acceptance tests.

When the motor was disassembled, there was dark discoloration in the windings where the brush was making contact with the bars of the commutator. It is possible that the motor would not start to turn if the commutator brushes were aligned at this location. Electrical engineers stated that the darkened area was unusual but not unprecedented. They believed the cause was "dithering," whereby power is supplied to the motor while it is stopped but there is not enough current to make it rotate. However, there was no evidence from the testing to indicate the motor was outside of specifications by the manufacturer. The Coast Guard Marine Safety Center concluded that the tests conducted by Twin Disc and Globe Motors did not provide sufficient evidence to determine the cause of the failure.[5]

Engine Transmission

The *Adventure Hornblower*'s main propulsion was provided by two Caterpillar C32 diesel engines connected to Zahnradfabrik Friedrichshafen AG (ZF) model BW 461 transmissions. Each transmission's gearbox consisted of reversing and reduction units. A control unit, which sat on the top of the gearbox housing, consisted of a spool valve for charging and draining the clutch packs, a control valve for the clutch pressure, and a time switch for modulation of the clutch pressure.

[5] US Coast Guard Marine Safety Center, *Adventure Hornblower Propulsion Control Casualty*, Memorandum 16710/P020410/cjr Serial E2-1603875, Washington, DC: Department of Homeland Security, August 1, 2017.

The spool valve was mechanically actuated by a selector lever located on the top of the control unit and set the position of the gears in the gearbox to forward, neutral, or reverse. The selector lever was positioned by the servo-actuator based on input from a Twin Disc EC300 integrated controller, which received command signals from one of the three dual-lever analog control station locations.

Although the vessel's engines had been replaced in 2013, the ZF transmissions were original to the vessel, which was 22 years old. The transmission manufacturer recommended various levels of regular maintenance based on operating hours or other conditions, with the most extensive maintenance levels designated as "A4" and "A5." The A4 maintenance included cleaning of internal and external components, checking critical subsystems, and replacing seals. ZF recommended that A4 maintenance be conducted every 4,000–6,000 operating hours or within 5 years. On March 31, 2016, the port and starboard transmissions on the *Adventure Hornblower* had over 66,000 operating hours each, yet the owner provided no evidence that A4 maintenance had been conducted in the life of the vessel.

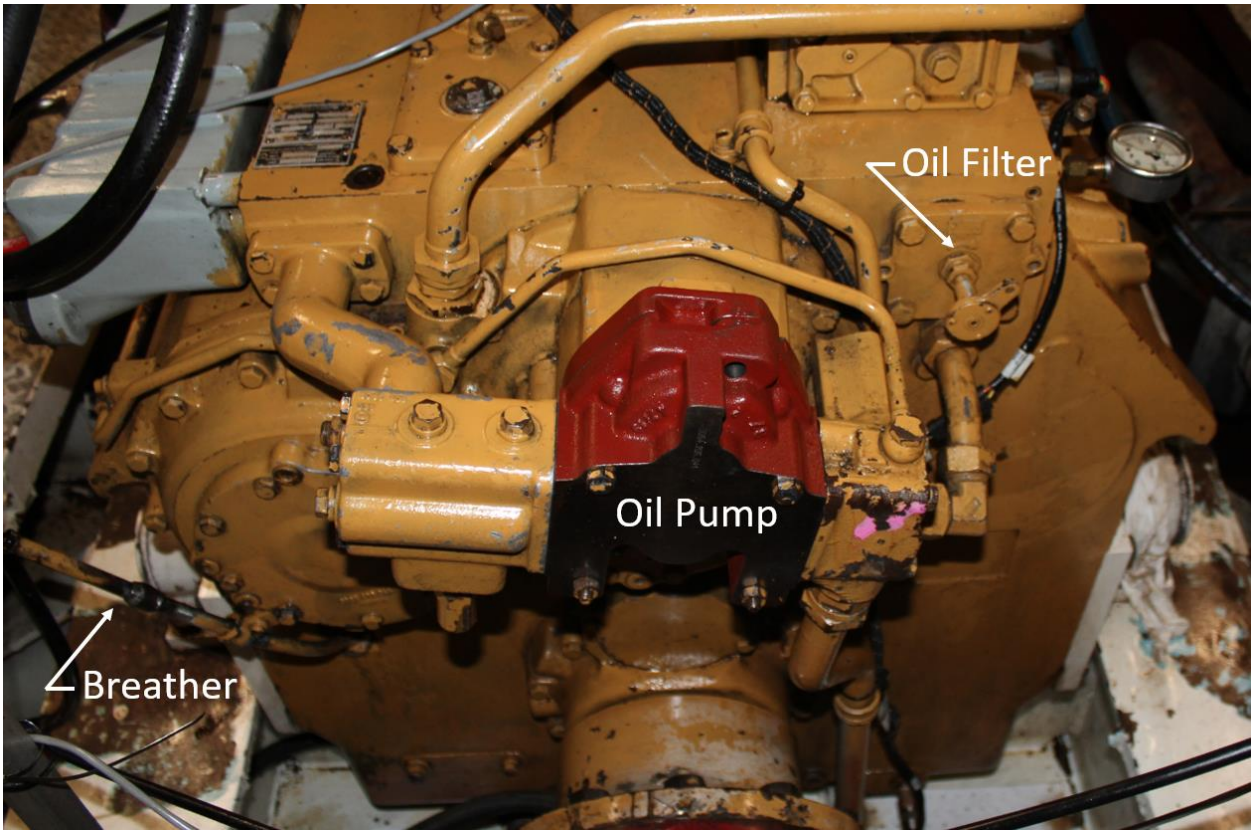
The A5 maintenance included an overhaul of the gearbox in addition to all A4 maintenance items. ZF recommended that A5 maintenance be conducted whenever the associated propulsion engine was overhauled. The original Caterpillar engines required overhaul every 15,000 hours and had been in operation from 1994 until they were replaced in 2013. These engines had well over 15,000 hours of operations before replacement, thus an overhaul of the engines and the A5 maintenance on the transmissions should have occurred. The changeout of the engines in 2013 should have also prompted the A5 maintenance. However, as with the A4 maintenance, the *Adventure Hornblower* owner could not produce evidence that the A5 maintenance was conducted on either the port or the starboard transmissions throughout the life of the vessel.

In addition to the oil leaks previously noted, the postaccident inspection revealed other discrepancies with the port transmission. The gearbox breather, which was integrated into the dipstick housing, had been welded shut at some unknown time, preventing proper ventilation of the transmission.[6] The sealed breather pressurized the system causing fluid leakage at the output shaft and seals. Furthermore, pressure remained in the system when the vessel was not in operation, adversely impacting the transmission's mechanical seal. A significant amount of oil was reported in the port bilge.

The transmission's oil filter knife edge ratchet was not engaging to turn as designed, leaving metallic and non-metallic debris to build up in the oil filter housing and on the filter. The debris reduced the flow of oil through the system that cooled and lubricated the clutch discs and gears. The transmission's engine-driven oil pump (red housing in the photo below) was replaced about 4 months before the accident due to low oil pressure. The problem was reported by a vessel captain who said that the transmission was "slipping," a condition that occurs when not enough hydraulic pressure is being produced to engage the gears. Low fluid levels can also contribute to

[6] As the transmission begins operation, the gearbox warms and the air inside it expands and escapes through the air breather, a vented opening located near the the top of the dipstick housing. As the transmission cools after operation, a vacuum is formed and the breather allows air to be pulled into the gearbox.

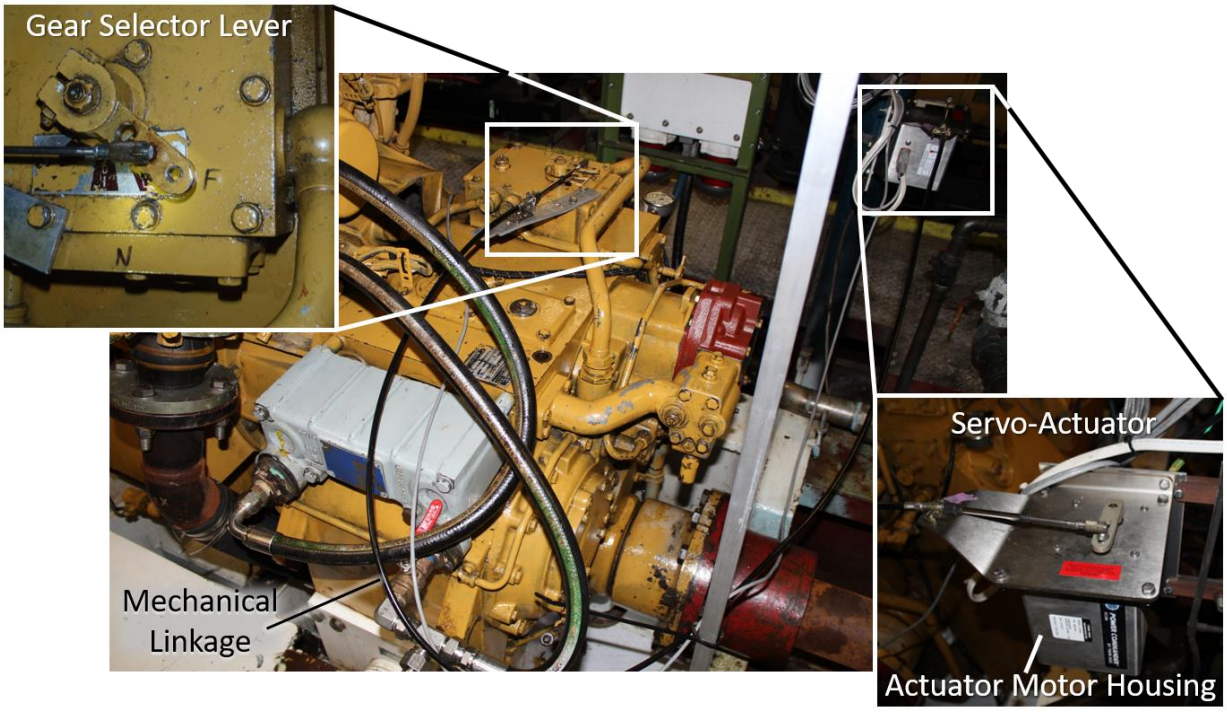
slippage, as well as a number of additional problems including overheating, worn gears, and increased torque required to actuate the selector lever.



Close-up of port ZF marine transmission with welded breather, oil filter, and replaced oil pump.

An examination of the starboard transmission likewise found discrepancies, including an overfilled oil sump, oil in the filter the consistency of "peanut butter," and an oil pump that was behind on two manufacturer-recommended upgrades. The lack of documented maintenance and the condition of the transmissions during the postaccident inspection indicate overall poor maintenance practices with the *Adventure Hornblower*'s main propulsion systems.

As the *Adventure Hornblower* approached the pier on the accident date, the port transmission failed to respond to the captain's helm orders. Investigators believe that the fault occurred between the servo-actuator, the mechanical linkage, and the control unit, most likely due to neglected maintenance to the port transmission and control system.



Port ZF marine transmission with close-up of the gear selector lever for the mechanical control unit in the forward position as found immediately after the accident. Also shown is a close-up of the Twin Disc control system servo-actuator. (Photos by Coast Guard and NTSB)

Maintenance Systems

The engineers and crew of the *Adventure Hornblower* had several methods, both formal and informal, for tracking maintenance requirements and deficiencies. These included work order emails, electronic logbooks, and the vessel's pass-down log. None of the information tracked was shared between these reporting mechanisms.

The work order email system allowed crews to report maintenance and repair issues to maintenance personnel while keeping the captains informed of the status of repairs. Investigators reviewed records from the system provided by the company, and reports included public-address and other sound system faults; galley equipment, lighting, and other electrical problems; and issues with the shore power connection. Work order emails provided to investigators did not include information related to the transmissions or other engine room maintenance issues.

A separate pass-down log (PDL) was a voluntary reporting mechanism that was kept in the vessel's wheelhouse. Log entries could be made by any crewmember or engineer, but did not necessarily align with the morning maintenance checklists completed by the engineers. This log stayed in the wheelhouse at all times. On January 20, 2016, an entry in the *Adventure Hornblower*'s PDL stated, "port transmission still leaking fluid bad." (emphasis in original) When investigators asked about this entry, no one knew who had written it. Engineers stated that they also kept an electronic logbook of maintenance items.

Verbal communications between the shore-based assistant engineers and the crew were not typical on a daily basis. Engineers would complete their morning maintenance checklists and leave them in the wheelhouse, often before the captain arrived. Unless there was a problem, this was the

only way information was passed from the shore-based assistant engineers to the operating crew. On the day of the accident, the morning maintenance checklist was completed, indicating all areas were "ok," including the oil levels in the engines, generators, and transmissions. The captain and first officer were aware of the transmission oil leak but did not believe the leak to be a major concern, assuming that the engineering staff would address it. The captain stated she was not aware of a work order to correct the issue. Small passenger vessels on domestic voyages operating under Title 46 *CFR* Subchapter K are encouraged but not required to develop safety management systems or keep maintenance records on board the vessels.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the allision of the *Adventure Hornblower* with the Navy Pier and the downtown San Diego seawall was a failure of the port transmission to disengage from the forward propulsion position due to the operating company's lack of adherence to the transmission manufacturer's recommended periodic maintenance schedule and the lack of routine maintenance and upkeep of the propulsion system's equipment. Contributing to the accident was the lack of instrumentation to provide positive indication of thrust direction or an alarm to indicate the propulsion control system was not responding properly to the captain's commands.

Adherence to Manufacturer's Recommended Maintenance Procedures and Intervals

This accident illustrates the potential safety hazards of failing to follow the equipment manufacturer's recommended maintenance procedures and schedules. Without necessary maintenance, equipment cannot be relied on to perform as designed. Mariners should review manufacturer manuals and guidance on a regular basis to ensure conformance with recommended maintenance plans.

Access to Vessel Controls and Distraction

Vessel controls that are located outside the bridge/wheelhouse and are accessible to non-crewmembers present the opportunity for tampering and may lead to the distraction of the operator. Owners and operators should designate a perimeter around these stations and ensure the area is secured when in operation.

Remote Propulsion Control Systems

Current technology allows vessels to be constructed and fitted with automated instrumentation and alarms that alert the operator in the event of critical failure; however, they are not required by regulation. The negative consequences of an undetected loss of propulsion control are elevated for passenger vessels because they carry more people on board, often transit in confined waterways, and dock frequently. Owners and operators are encouraged to install instrumentation that provides a positive indication of propulsion thrust direction and/or a deviation alarm at bridge/wheelhouse and remote propulsion control stations. Such indications/alarms increase the likelihood of early detection of improper propulsion response, thereby allowing the operator time to take effective corrective action.

Vessel Particulars

Vessel	*Adventure Hornblower*
Owner/operator	Hornblower Marine Assets L.P. / Hornblower Cruises & Events
Port of registry	San Diego, California
Flag	United States
Type	Passenger vessel
Year built	1994
Official number (US)	999192
IMO number	N/A
Classification Society	N/A
Construction	Steel
Length	142.8 ft (43.5 m)
Draft	10.5 ft (3.2 m)
Beam/width	33 ft (10.1 m)
Gross tonnage	94 gross tons
Engine power, manufacturer	2 X 1,000 hp (745.7 kW) Caterpillar C32 diesel engines, ZF Marine Transmission, Model BW 461, Ratio 4.29:1
Persons on board	149

NTSB investigators worked closely with our counterparts from Coast Guard Sector San Diego throughout this investigation.

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA16FM035.

Issued: August 25, 2017