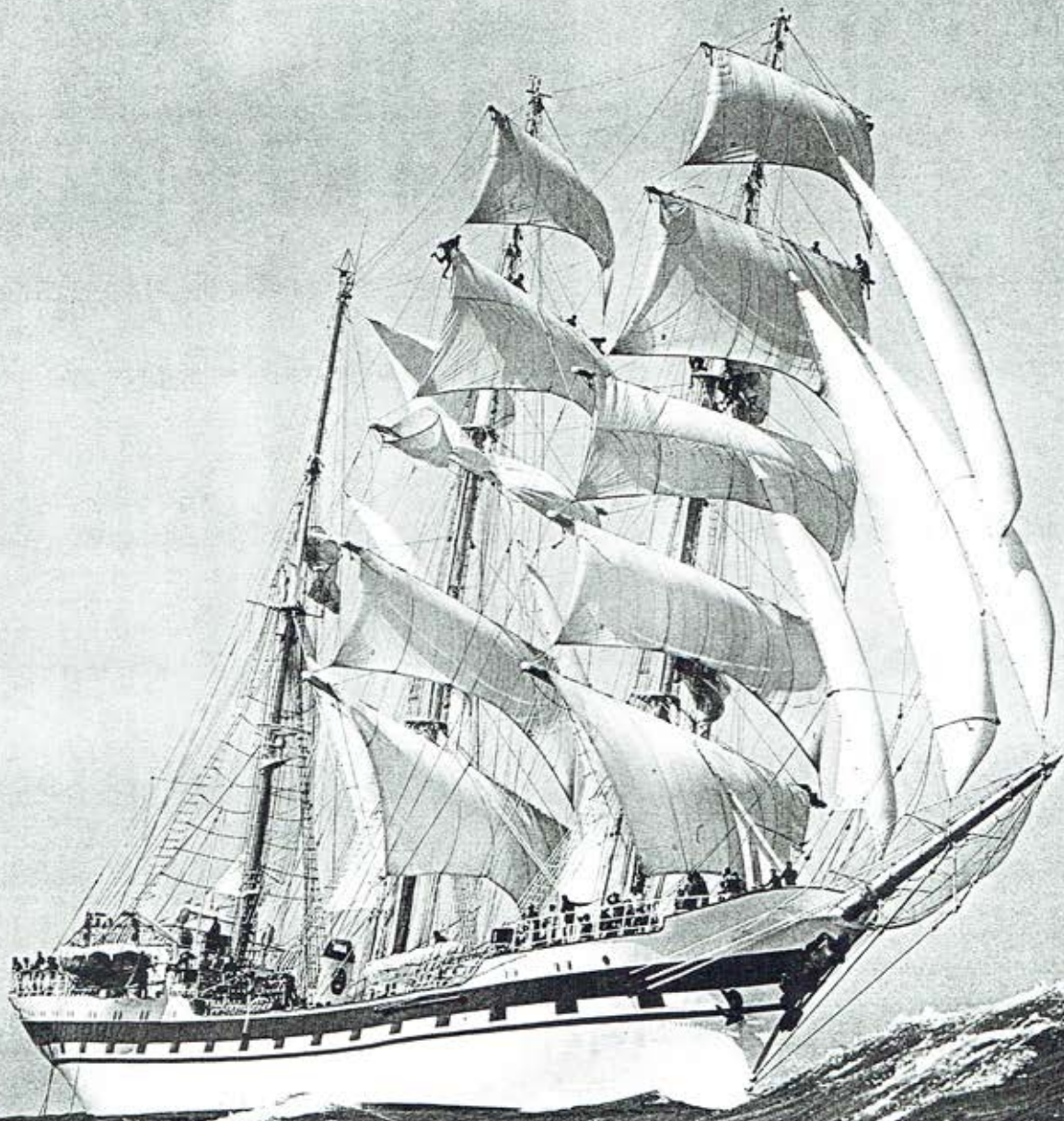


SAILING SHIPS OF THE WORLD

with a foreword by
HRH The Prince of Wales



Erik C. Abranson

damping for there to be plans to convert the Flume stabiliser tanks already in-built for additional fresh water capacity.

There are three decks below the weather deck, without sheer or camber, the lowest being the tank top on which there are working, storage and machinery spaces, and some crew accommodation. The various decks step up 2m at the collision bulkhead, and 1m at the aftermost watertight bulkhead. Between these steps there is, in effect, an exposed well deck with solid bulwarks giving a continuous sheer line which is just not flat. The forecastle and quarter-deck are protected by stanchions and rails.

A Deck, one down from the weather deck, is the bulkhead deck and below it there are in all four or five watertight bulkheads, according to deck, with level changes at watertight bulkheads fore and aft introducing a certain complexity. Hydraulically operated sliding watertight doors by Winel of Assen separate the main compartments, but the collision bulkhead is not penetrated, access being from above only. The lines are built to meet Lloyd's Register +100A1 Sailing Vessel LMC requirements (they are believed to be the first barquentines so classed by LR this century), also those of the Belgian state inspection, the US Coast Guard (approval for foreign vessels visiting US ports), and US Public Health, as well as meeting IMO and MARPOL rules. Hull structure is steel throughout. Structural design work was by Den Boer, Dordrecht, and steelwork by the Conoship group fabricator Centraal Staal, of Groningen. There are both transverse web and bar frames and close-spaced longitudinals.

Accommodation for 194 passengers

On C Deck, below the waterline, are four four-berth crew cabins with washroom, a store and bow thruster room.

The weather decks have an impressive air of authenticity, with iroko planking and a barquentine sailing rig designed by Olivier van Meer.



all forward of the collision bulkhead. At the lower level abaft this are three more crew cabins for two, three and four persons, with associated washroom and crew's mess.

Aft from another watertight bulkhead are the galley, with two lifts to the dining room on A Deck, refuse plant room, laundry, cold store and freezer, with tanks (Flume and fuel) outboard. From there to the stern are main and auxiliary machinery spaces (including a Promac reverse-osmosis fresh water system) and associated stores.

B Deck lies just below the design waterline. At the higher level forward of the collision bulkhead are two-berth and four-berth cabins with associated washrooms for a further 22 crew. Virtually all the rest of this deck is given over to 46 passenger cabins with twin or double berths and, in some cases, provision for a third berth. There is also a two-berth crew cabin. The Sperry Transmark steering machinery occupies the aft peak in the raised part of this level, and there are air-conditioning and fan rooms. The air conditioning system was installed by Fläkt Belgie using Heinen & Hopman chillers.

On A Deck is a forepeak boatswain's store, crew and officers' cabins, more passenger cabins, and a dining or conference room for 200 people amidships, with adjacent pantry served by the galley lifts. Worked into the lengthy counter on the raised part of this deck is a special owner's cabin. There is also a ship's office and a shop.

The weather deck has a superstructure from mid-length to the bridge forward, accommodating a large bar, also serving a bar on the open deck, larger passenger cabins, and a ship's hospital. There is a sunken area in the bar with a piano, below a swimming pool on the deck above which has glazed ports through which swimmers can be seen from the bar. The pool is stepped to

allow different filling depths according to weather conditions.

Mainly open bridge

The bridge is mainly open with a forward steering position, the enclosed part at a lower level being a chartroom and communications office. In this section of the superstructure, separated from the cabins by a wide athwartships walkway, is an emergency diesel generator room. The forecastle deck has a 6 tonne Brusselle windlass and two capstans, and a number of Emce sail handling winches.

A smaller superstructure aft houses a spacious library and two more large passenger cabins. On the deck above is the after steering position, from which the whole rig can be seen. A coach roof and skylight arrangement give additional headroom over the owner's cabin right aft, on the raised section of A Deck. Between this and the nearest deckhouse forward is another swimming pool with jacuzzi facility.

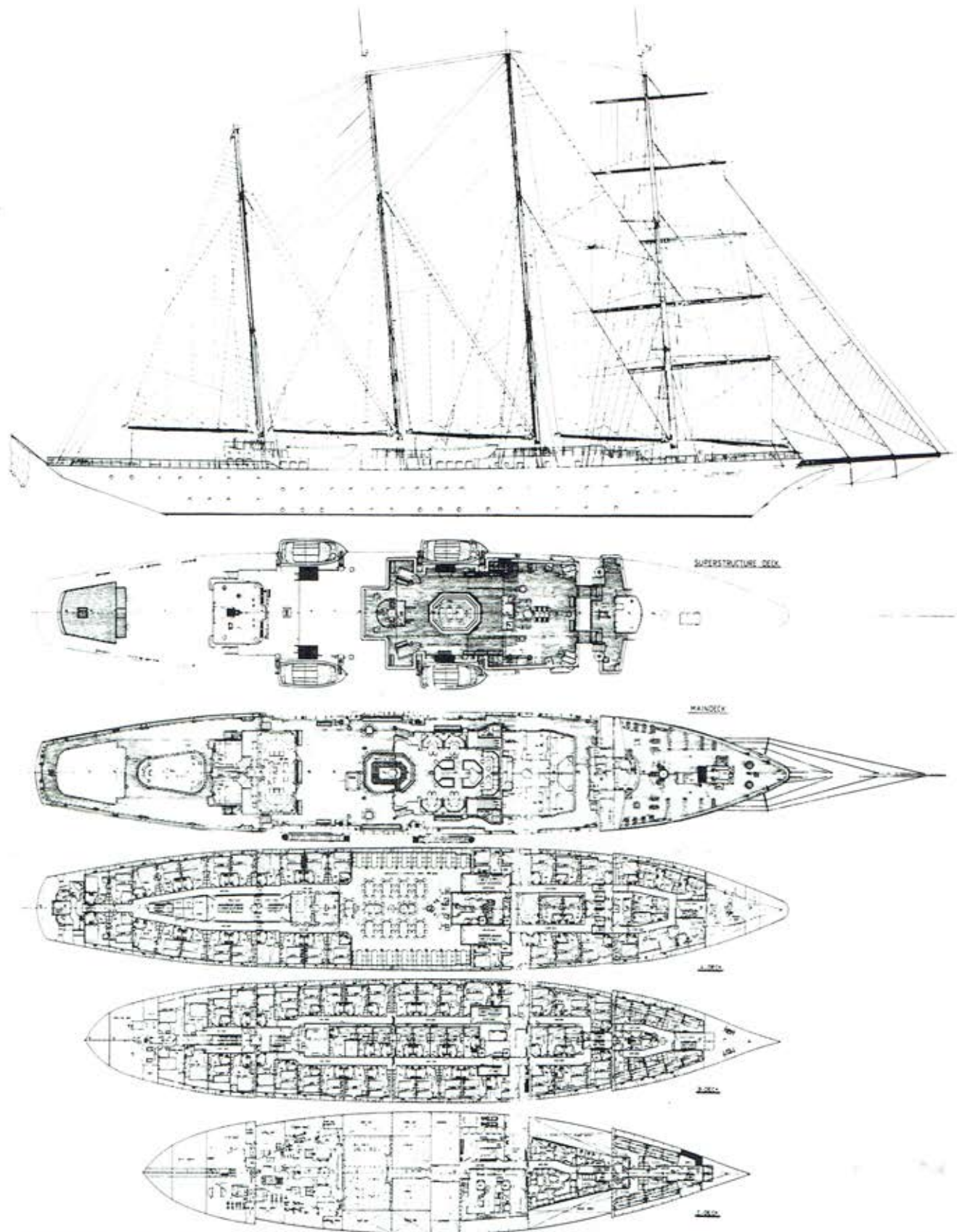
High standard of joinery

Care has been taken with joinery detailing and finish both in the cabins and in public spaces. There is much use of dark polished hardwood veneer, and a moulding trim of three-stranded rope form is a recurring theme. Many cabins have required special joinery treatment to fit within the curve of the hull form. Standard cabins have WC and shower cubicles (with Evac vacuum toilets), mainly of modular construction supplied by the Swedish specialist E-Modul. First-class cabins have full jacuzzi baths.

All outside cabins — and these are by far the majority — are lit by glazed ports from van Wingerden of Gorinchem, and particular attention has been given to the placing of electric lighting in all cabins. Accommodation design has taken account of the likelihood of a steady 20 deg heel under sail. Fire detection throughout the ship is by Autronica equipment, with extinguishing by a CO₂ system in the galley, a van Rijn sprinkler system in the accommodation, dining room and bar, and a Halon 1301 system by the same company in the machinery spaces.

The lower part of the weather deck is fitted with some Emce sail handling winches and other equipment. There are also open air tables and seating near the outside bar, and an awning can be rigged here. The weather deck also forms the boat deck with four 52-person motor lifeboats by Mulder & Rijke carried in Schat davits; these double as launch tenders. Interestingly, they are powered by Perkin diesel engines driving water jets (in the interests of swimmer safety) and are provided with anchors and electric windlasses for lying off beaches. There are also six 20-person inflatable liferafts forward on the deck above the main superstructure.

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General arrangement plans of the 2,298gt sailing cruise liners Star Flyer and Star Clipper, built by Scheepswerven van Langerbrugge and conceived to give passengers the feel of a 19th century clipper.

Each launch/lifeboat has its own accommodation ladder worked into the ship's bulwarks immediately below its stowed position.

The exposed weather deck and superstructure decks are laid with iroko planks, payed with synthetic rubber

caulking and set in epoxy resin on marine ply, which is itself set in bitumen on the steel plates. Cap rails and other deck trim are of varnished iroko.

Sail rig evokes clipper days

It was an essential requirement of the

ships' design that they should give an authentic feel of what it was like to be aboard a clipper ship. This has been achieved by adopting the barquentine rig, with the foremast crossed by a full set of squaresail yards: course, upper and lower topsails, topgallants and

royals. Overall, the rig is one of the most interesting aspects of these ships.

The work was contracted to the rigging group of the naval architectural consultancy Olivier F van Meer, of Enkhuizen, Holland. This team of six, which now specialises in work of this kind, was responsible for concept, overall design, rig detailing, specifying materials, purchasing, installation, bending sails and conducting trials.

The squaresails are furled into the hollow aluminium alloy yards using a system designed and developed by van Meer, which is the subject of a patent application. The rollers are powered by geared hydraulic motors in the yard arms. These have removable end covers. The yards are long enough overall to accommodate the full width of each sail's foot, which is greater than that at the head. The hydraulic lines from the power unit run up inside the foremast.

The other main feature of the squaresail rig is the brace winch. The original 1907 Jarvis pattern was adopted as a basis. In this three pairs of matched conical winch drums are driven through gearing from a shaft turned by manual cranks at each end. The drums have scores so that the falls of the braces are guided into place. In each pair one is arranged to haul the port brace while the second drum veers the starboard one, or *vice versa*. The conical taper ensures that tension is maintained as the geometry changes when the yards are braced round. The three pairs of drums serve the braces of the course and upper and lower topsails. Each brace is double ended with the end not led to the brace winch tailed with a single whip purchase for final adjustment by hand.

This Jarvis design has been developed by van Meer using modern materials to reduce weight and ease maintenance, and a hydraulic drive incorporated. This version is installed in *Star Flyer*; for *Star Clipper* the owner was, we understand, considering fitting an actual replica of the original Jarvis design, in the interests of authenticity and appearance. At the time of writing the final decision had not been made. The brace winch is installed on the superstructure deck just forward of the mainmast.

The four masts are of steel, fabricated by Marlift BV, of Groningen. Booms are also of steel, apart from that of the mainstaysail which is of aluminium alloy to minimise deviation effects on the magnetic compass at the steering position on the forward superstructure over which it swings. The masts are stepped through superstructure and upper decks and supported on steps deep in the hull, or on struts worked into main bulkheads where required by the structural arrangement. The Corten A steel exhausts of the three diesel engines aft are led up through the jigger to its head, well above decks.



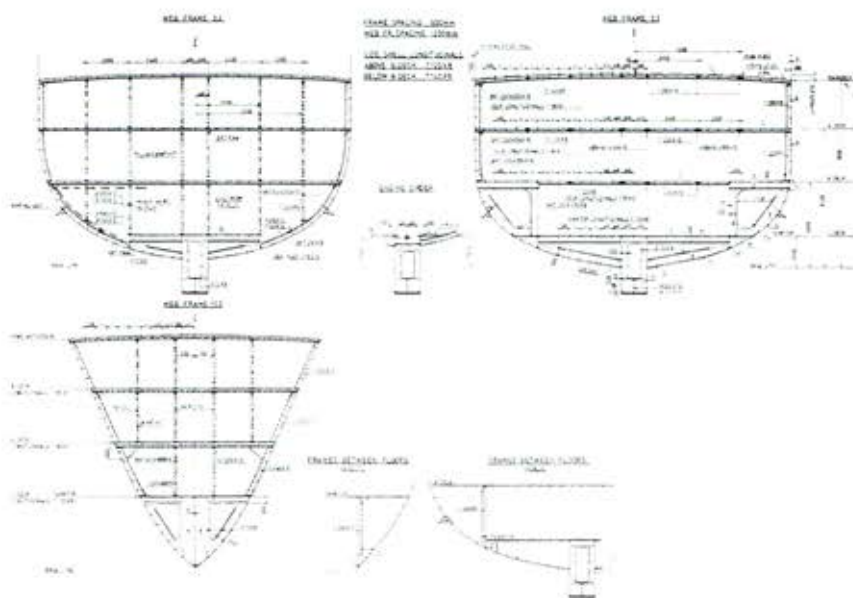
The first of the pair, Star Flyer, seen at Southampton and displaying her barquentine sailing rig in its furled condition.

Standing rigging is of steel wire rope, typically 25mm-30mm, with socket terminals. Masthead stays are duplicated. The foremast has forestays to stemhead and bowsprit/jib boom, the latter having bobstays and dolphin strikers. The foremast also has shrouds and standing backstays. The remaining three masts have shrouds and both standing and running backstays, the last with purchases tailed to Bariant mechanical winches, although on the jigger mast the after hydraulic warping capstan is used. Other running rigging is handled on electrical winches and snubbing winches located at various points at deck. Standing and running rigging is supplied by Staalkabel to van Meer design.

All masts have forestays with

staysails, four on the foremast (including three jibs), two on the main, and one each on mizzen and jigger. The upper mainstaysail is furled on a hydraulically powered roller of a standard available type. Remaining staysails tacked to the deck are boomed and loose-footed, and fitted with lazy-jacks and downhauls. On main and mizzen there are sails running on tracks the full hoist length of the aft side of the mast, sheeted to the mast next astern, staysail schooner fashion. On the jigger is a Bermudian-style spanker, loose-footed to a boom, with lazy-jacks. All sails are of Terylene by Cheong Lee Sailmakers of Hong Kong, for whom van Meer is the Dutch agent.

The squaresails provide authenticity



Steelwork details for various parts of the White Star clipper hulls.

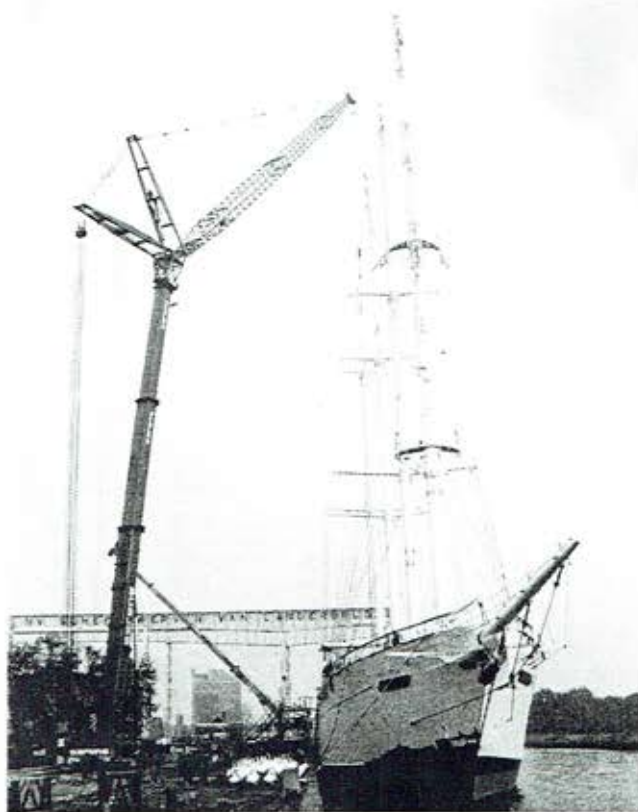
and atmosphere, and will enhance performance with a fair wind. The considerable area of fore-and-aft canvas should ensure respectable windward performance, taken with the salient keel.

Full-feathering propeller for auxiliary propulsion

In the machinery room aft are three vee-form Caterpillar diesel engines driving alternators for the hotel load and providing auxiliary propulsion. The propulsion engine, a twin-turbocharged 12-cylinder vee-form 3512D1-TA model rated at 1,015kW at 1,600rev/min, is flexibly mounted and drives a Lips fully

feathering three-bladed cp propeller of 2,700mm diameter through a flexible coupling and Reintjes LAF870K31P gearbox with a reduction ratio of 6.909:1. A 250kW electric motor is coupled into the reduction gearbox to provide 5-knot get-you-home propulsion, supplied from the ship's diesel-alternators in the event of main engine failure.

A pair of flexibly mounted 3508-type diesel engines driving alternators rated at 700kVA (560kW) at 1,200rev/min are installed either side of the propulsion engine. The emergency set in the bridge superstructure is rated at 116kW at 1,800rev/min and is also powered by a



The last mast, the jigger, being stepped at the shipyard with the assistance of a crane. The furling arms, waiting for installation, can be seen on the quay.

Caterpillar engine, a 3304D1-T model. Manoeuvrability is enhanced by a Lips fp bow thruster driven by a 200kW ABB electric motor.

Feel of authenticity

On the weather deck these ships give an impressive feel of authenticity. They are genuine sailing vessels rather than cruise liners with sails, like some of their modern predecessors. Using the recognised measures of cruising yacht design (see, for example, Peter Ibold's *Evaluating offshore yachts*, a paper to the RINA Small Craft Group's conference *The Seaworth Cruising Yacht*, November 1991), displacement/length and sail area/displacement ratio are representative of accepted practice in much smaller sailing vessels. The White Star clippers, with 3,300m² of sail on an overall length of 111m (including bowsprit) compare favourably in these re-



Careful checking as one of the masts is stepped.

spects with the Windstar Cruise ships (2,000m² on 134m length oa) and *Club Med 1* (2,500m² on 187m length oa). These two designs were discussed in *The Naval Architect*, February 1987 page E77, and June 1990, page E273 respectively. The White Star twins are the only ones of these to set a full mast of squaresails. For comparison, *Cutty Sark* in her prime is credited with some 3,000m² of sail on an overall length of 85m. Her displacement was about 82% of that of the White Star ships.

Against these achievements one is tempted to criticise the hull as seen from outboard for the rather high freeboard, emphasised by white paint and an absence of tumblehome (needed to give daylight to so many passenger cabins) and the breaks in the lines of portlights at the points where the decks are stepped. There is also a certain incongruity in the long counter to those whose eyes are attuned to the likes of *Cutty Sark*. Nevertheless one can only wish White Star Clippers well for a successful future with these elegant and well finished ships. ©