

HENRY DREYFUSS DESIGNS THE OCEAN LINER

by

Christian Timothy Roden

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Master of Arts in American Material Culture.

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...

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ABSTRACT

Between 1946 and 1951, Henry Dreyfuss designed six ocean liners for the American Export Lines, Inc. As one of the foremost industrial designers of the twentieth century, he not only designed the interior spaces but also eventually organized the entire project to facilitate communication and collaboration between the designers, builders, and the shipping line to produce the best ocean liners possible. In doing so, Dreyfuss drew upon his previous experience designing other forms of transportation, including trains and airplanes, to achieve workable solutions to problems of organization, maintenance, and livability in these floating environments. He acknowledged that the practical experience and knowledge of his colleagues, in terms of shipbuilding and running a business, influenced his own approaches.

This project reconciles three fields that have been separate scholarly entities since the 1970s, as far as ocean liners have been concerned: the social and design history of ocean liner travel, the engineering and structural considerations of large ship design, and the business considerations of running a complex transportation system as part of the American Merchant Marine. The author cross-references Dreyfuss's working drawings and writings with the surviving business records of the American Export Lines and contemporary trade publications to create a full understanding Dreyfuss's working process. Using six vessels as a case study, this thesis places these

disparate focuses of study back into dialogue with each other, as they would have been during Dreyfuss's collaboration with American Export Lines.

INTRODUCTION

By the 1950s, America's transportation options had reached a turning point—a rare moment when advances in technology significantly changed how people moved from place to place. The jet engine, as well as the interstate highway system, suddenly reduced transoceanic or transcontinental journeys to a matter of hours, rather than weeks or days. For the American public, such a transportation shift had not occurred since the mass-production of the automobile. As with any change, it took time to catch on. Until well into 1970s, ocean liners, themselves a paradigm shift of the latter half of the nineteenth century, remained a viable option for transoceanic travel. This shift in technology and behavior can be understood as distinct “before” and “after” moments, but the reality is that many people were involved in both methods of transportation. Henry Dreyfuss, the American industrial designer, helped design both with an eye towards their commercial success as Americans bridged the gap between a nineteenth century approach to travel and the twentieth and twenty-first century obsession with speed. The result, particularly for his ocean-going designs for the American Export Line, was a unique moment in sea travel that combined modern aesthetic and organization with the older, and slower, approach to speed. This thesis considers Dreyfuss's work for the American Export Lines as the intersection of ergonomics, industrial design and psychology, and economic necessity.

Unless one happens to have a particular interest in twentieth century industrial design, Henry Dreyfuss's life and work tend to fly under the radar. A reasonably well-informed enthusiast of twentieth century American may know about Raymond Loewy,

a colleague in the field who possessed a flair for the dramatic gesture. The Cooper-Hewitt National Design Museum recently brought attention to Norman Bell Geddes, Dreyfuss's mentor, with a retrospective exhibit. Despite the relative lack of name recognition and popular attention, Henry Dreyfuss's designs—and more important, his design philosophies—have had the most enduring effect of all his design contemporaries.

Piecing together his biography from the readily available sources produces little more than the essential statistics. Henry Dreyfuss, the elder of two boys, was born on March 2nd, 1904, in Manhattan to Louis Dreyfuss and Elsie Gorge Dreyfuss.¹ His father was a first-generation American, his mother had immigrated from Germany as a child. Dreyfuss never sought to tell his full life story publicly. Throughout his working life, and indeed, up until his death on October 5th, 1972, he rarely mentioned his earliest years.² The earliest events referenced in his 1955 autobiography *Designing for People* are his designs for “settings for stage presentations in the old Strand motion-picture theater on Broadway, in New York,” executed when as a seventeen-year-old.³

Designing for People's publisher supplied more of the story in the book's introduction. Dreyfuss attended New York City Schools and then the Ethical Culture School. By his mid-twenties he was a successful stage designer. His first industrial

¹ Russell Flinchum, *Henry Dreyfuss, Industrial Designer: the Man in the Brown Suit*, (New York: Rizzoli International Publications, Inc., 1997), 22.

² Ibid., 21.

³ Henry Dreyfuss, *Designing for People* (New York: Simon and Schuster, Inc., 1955), 15.

design office, opened in 1929, consisted of a single room furnished with two folding tables and a 25-cent philodendron plant. Within five years he had hired multiple assistants to his bustling design firm, named Henry Dreyfuss & Associates.⁴ Aside from the book's dedication to Doris Marks, Dreyfuss's wife, there are few intimate details. In all his surviving speeches and articles, he presented an carefully curated public façade. Despite this care, Dreyfuss possessed a vibrant sense of humor. He was never afraid to put the audience at ease with a gently self-deprecating anecdote or a humorously exaggerated prediction about the future technology. He also confessed to a marked fondness for good Dutch cheese.⁵ As with his designs for the theater, Dreyfuss wanted his work to take center stage, and preferred that he remain offstage rather than seeking the spotlight as celebrity-designer.⁶

To replace the personal biography, Dreyfuss created a professional biography, a multi-faceted curriculum vitae of sorts that balanced his design aesthetic with solid business sense that would appeal to clients concerned with the bottom line. *Designing for People*, the first of his three major publications, was a book with three purposes: it summarized his major projects up to 1955, it offered a self-analysis of his design philosophy and its relationship to the consumer market (each chapter included information on the commercial benefit reaped by his clients), and offered him the chance to situate himself within the field by defining his vision of good industrial design. While Dreyfuss was one of the first generation of significant American

⁴ Dreyfuss, *Designing for People*, 12.

⁵ Ibid., 63.

⁶ Flinchum, *Henry Dreyfuss*, 126.

industrial designers, a field commonly believed to have taken shape in the 1920s with the advent of modernism, he stretched the origins in *Designing for People* back by four centuries to Leonardo da Vinci, in his estimation the “greatest of all industrial designers.”⁷ Other lauded thinkers included Christopher Columbus, for deciding to sail the globe the wrong way round, Benjamin Franklin, and Thomas Jefferson, both thinkers and tinkerers of great renown in their own day. Dreyfuss’s list ends with two nineteenth century figures: Sir Henry Cole, who founded the Council of the Society of Arts in 1847 to promote the “union of the artist and workman,” and Catherine Beecher, a reform-minded woman who sought to alleviate household drudgery through organization of space and work.⁸ All of these people made Dreyfuss’s list for the reason that they were willing to rethink the long-established status quo: “Strong-willed men rejected tradition where it stood in the way of utility and comfort.”⁹ This mildly subversive approach to traditional history became key to Dreyfuss’s success, and his public biography became one of professional design innovation and success.

A recurring theme in Dreyfuss’s designs, and one that helped define his success and lasting legacy was his interest in ergonomics—the study of human proportions and their relation to and movement through surrounding space. Throughout the 1930s and 40s, Dreyfuss’s office developed a series of measured anatomy drawings—quirkily nicknamed “Joe” and “Josephine”—that represented not

⁷ Dreyfuss, *Designing for People*, 19.

⁸ Ibid., 19-22.

⁹ Ibid., 20; as Dreyfuss did not add Ms. Beecher to the list until the next page, his reference remained patriarchal for the time being.

just the average measurements of the American public, but also the extreme ends of the spectrum for testing purposes.¹⁰ “Our job,” he wrote, “is to make Joe and Josephine compatible with their environment... [to fill] the gaps between human behavior and machine design.” Dreyfuss realized this scientific approach to the relationship between manufactured products and the human body had profound commercial implications, and believed that he could modify his approach based on the type of product. A train, ship, or airplane catered to a mass clientele, and so “the industrial designer’s techniques and understanding of the mass mind can be readily applied” to the design challenges of these spaces.¹¹ For transportation companies, an understanding of a paying clientele was essential to financial success. For the American Export Line, hiring Henry Dreyfuss was a chance to reinvent their image as a modern, exciting, and glamorous company.

The exact date on which John E. Slater, then vice-president of the American Export Lines, Incorporated, asked Dreyfuss to work on designs for their new vessels remains something of a mystery. According to Dreyfuss’s version of events, Slater asked him to lunch at his club, and wrote the question on the back of an envelope so that no one would overhear.¹² Dreyfuss’s “Brown Book” indicates that his firm started a “preliminary scheme” for a passenger boat some time during 1944 (months and dates were not recorded until 1948).¹³ By then, Dreyfuss was already well established in the

¹⁰ Dreyfuss, *Designing for People*, 26-27.

¹¹ *Ibid.*, 111.

¹² *Ibid.*, 125.

¹³ Henry Dreyfuss, Curriculum Vitae or “Brown book,” Henry Dreyfuss Archive, Cooper-Hewitt National Design Library.

field, and had completed several large-scale transportation related commissions for the New York Central System over the previous nine years, and the American Export Airlines for the past five.¹⁴ His professional relationship with the American Export Lines lasted until 1957, and produced four cargo-passenger combination liners, two larger passenger liners, company ticket offices in Washington, Hoboken, and Philadelphia, and maintenance plans for all company vessels.¹⁵ As a man of omnivorous interests and voracious curiosity, his work on these ships, particularly the *Independence* and *Constitution*, were lengthy undertakings that not only tapped his knowledge in all of the above-mentioned fields, but also his skills as a communicator. His previous experience designing airplanes and train cars also informed his decisions, particularly with regard to his knowledge of incipient changes to public transportation patterns due to the jet-powered airplane. The *Independence* and *Constitution* also mark a turning point in Dreyfuss's career. Although he did not retire until 1969, eighteen years after their launch, these were the largest and most logistically complicated projects of his career. He maintained an active role in Henry Dreyfuss & Associates, but focused more on writing and lecturing, culminating in the *Symbol Sourcebook* of 1972.

The amount of scholarship on Dreyfuss remains limited. His work has been the theme of two major exhibitions at the Cooper-Hewitt—one in 1971, and a second in 1997. The attendant biographical catalogue for the latter, Russell Flinchum's *Henry Dreyfuss, Industrial Designer: The Man in the Brown Suit* remains his only full-length

¹⁴ Henry Dreyfuss, "Brown Book."

¹⁵ Ibid.

biography. Discussion of his work in context with modern design tends to be limited to brief references, or at best a paragraph. Industrial design has fared somewhat better in terms of academic attention (though it is a dubious honor, at best), as it conveniently falls under the category of twentieth century design, which has received a steady stream of interest since the last quarter of that century. The academic study of ocean liners is a small, but growing field. The recent centennials of the *Titanic* disaster, and the careers of such famous engineering marvels as the *Lusitania* and *Mauretania*, have helped tip the scales towards serious academic study.

Despite this progress, the study of ocean liners remains fractured and selective. The best and most thorough writing comes from the social histories of John Maxtone-Graham and John Malcolm Brinnen, pioneers of the field in the 1970s when companies regarded liners as economic dinosaurs and rapidly retired them. Recently, Anne Wealleans, and Philip Dawson, and J. Kent Layton have published thoroughly researched books with scholarly citations about ocean liners, the first time such sources have been available.¹⁶ By and large, these studies have all focused on the interior design and decoration of these ships. While this topic is a central theme of my work—as the interior spaces are integral to passenger comfort and hence the financial success of any passenger vessel—this project employs a systems approach to bring engineering, planning, and people-managing elements of running mass transportation units back into the discussion.

¹⁶ John Maxtone-Graham, *The Only Way to Cross* (New York: The Macmillan Company, 1972); John Malcolm Brinnen, *The Sway of the Grand Saloon: A Social History of the North Atlantic* (New York: Delacorte Press, 1971); Anne Wealleans, *Designing Liners: a History of Interior Design Afloat* (New York: Routledge, 2006); Philip Dawson, *The Liner: Retrospective & Renaissance* (New York: W.W. Norton & Company, 2006); J. Kent Layton, *Atlantic Liners: A Trio of Trios* (Lulu Press, 2009).

The success of Henry Dreyfuss's designs for transportation—and indeed, the success of his work in general—was due in large part to organization: the organization of the firm, the organization of the client relationships, and the organizational order of the designs themselves. Dreyfuss never lost sight of the human element of his projects—his products, and certainly the spaces he designed for trains, airplanes, and of course ships, were meant to be “ridden in, sat upon, looked at, talked into, activated, operated, or in some other way used by people.”¹⁷ He was a man who, above all, listened. By listening he understood, and by understanding he created. These empathetic relationships, based on the people, are what made him a success.

¹⁷ Dreyfuss, *Designing for People*, Front Cover.

Chapter 1

THE VISIBLE AND INVISIBLE HANDS

The American Export Lines, Incorporated (AEL) retained Henry Dreyfuss in 1944 to work on their ships at a brief and unique moment in their history. After twenty-five years of cargo and passenger service to the Mediterranean, the company leadership realized they would face new challenges and opportunities with the conclusion of World War II. Hiring an industrial designer was one of their strategies to refine their existing business strategy. The economic considerations of running a shipping line, like all transportation enterprises, depended on the development of an efficient and logical system. Large steel-hulled cargo ships may have been one of the more visible results of the industrial revolution of the nineteenth century, but the notion of a modern business system was equally important. These highly organized and professionally managed entities, according to business historian Alfred DuPont Chandler, Jr., began to compete with and eventually replaced the mysterious “invisible hand” of market forces.¹ This, more than any technological advancement, was the hallmark of a modern commercial enterprise. While Chandler never theorized the complete disappearance of market forces (demand, after all, is what drives the market), he viewed the managed business enterprise as the replacement for directing the flow of goods through production and distribution and for fund allocation—

¹ Alfred D. Chandler, *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, MA: Belknap Press, 1977), 1.

processes that had previously been directed by the market forces themselves.² This increasingly managed flow of funds and services eventually came to be known as “system-building.” The internal organization may have been the purview of the middle and lower management, but the overall flow, on which depended the financial well-being of the company was the “almost completely the task of top management.”³ While the American shipping industry never matched the size or profitability of even a small railway system, they held an increasingly complex role on the international stage.⁴ Particularly before World War II, ships served as the primary points of contact between distant independent nations. Any controls enacted by one nation can potentially affect not just those who directly trade with that nation, but also those in the second degree of relation when the directly trading nations react to new regulations.⁵

The relationship between Henry Dreyfuss and the American Export Lines, particularly John E. Slater, the company vice-president and later president from 1935 until 1956, accomplished two tasks that helped to chart the course of the American Export Lines for the next fifteen years. It primarily improved the company’s system by enacting changes in the internal flow of funds and personnel services. It also introduced industrial design and several decades of design research, into the merchant

² Chandler, *The Visible Hand*, 1.

³ Ibid., 145.

⁴ Ibid., 189.

⁵ John G.B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914: an Economic History* (Cambridge, MA: Harvard University Press, 1941), 3.

marine. Both these considerations treated Dreyfuss and industrial design as a problem-solving tool, rather than a form of aesthetic styling.

As the main provider of overseas traffic and international mail services, and an important additionally to coastal railroad and highway traffic, shipping companies required an effective business system.⁶ National companies such Great Britain's Cunard Line, or France's Compagnie Générale Transatlantique relied on heavy subsidies from their governments to maintain large fleets with a diverse array of vessel sizes and types ranging from large express liners to small cargo steamers. These "well-rounded" fleets suited the various needs of the companies' clientele on different routes. Such practices also helped distribute the considerable overhead costs more broadly.⁷ American companies never quite reached these levels, and many of the independent companies concentrated on one route or one type of shipping. For most of its existence, the American Export Lines was one of these smaller specialty firms.

American Export Lines was a company of opportunity, relying on somewhat of a readymade business system with little strategy. Founded in 1919 thanks to the offer of surplus government vessels built or acquired during World War I, the company's financial status rested on the volatile business that characterized the 1920s. Although the shipping board covered its operating expenses, AEL faced severe financial difficulty within a year of its founding, allowing entrepreneur Henry Hebermann—an owner of trucking, warehouse, and lighterage firms—to purchase the company on a loan. Despite his prior experience, he proved to be, at best, an inconsistent business

⁶ Hutchins, *The American Maritime Industries and Public Policy*, 4-5.

⁷ Ibid., 487.

strategist.⁸ His commercial coups included expansion to Mediterranean routes just before the end of British monopoly on cargoes of Egyptian cotton, a flurry of generous mail subsidies, and four years of contract voyages to Soviet ports on the Black sea.⁹ The biggest single deal of Hebermann's tenure was the 1925 purchase of eighteen government-owned freighters for one million dollars. Despite these contract successes, the first fifteen years of AEL's existence followed the boom and bust cycle characteristic of pre-depression American business ventures and their post-crash consequences.¹⁰

The company's first forays into passenger traffic occurred as something of an afterthought in 1927. The popularity of slow summer cruises to Mediterranean and Baltic ports convinced AEL executives that expanding into the passenger market would be a profitable venture. Soon, all ships in the fleet sported accommodations for up to twelve passengers. When demand exceeded that capacity, AEL ordered four brand-new combination passenger and cargo ships with space for 100 passengers each.¹¹ This quartet of ships—the *Excalibur*, the *Excambion*, the *Exeter*, and the *Exochorda*, popularly dubbed the “Four Aces”—were poorly planned and timed. Completed in 1930 and 31, during the worst months of the Great Depression, their sixteen-knot service speed was too fast for economical cargo-carrying yet too slow for

⁸ René De La Pedraja, *A Historical Dictionary of the U.S. Merchant Marine and Shipping Industry Since the Introduction of Steam* (Westport, CT: Greenwood Press, 1994), 25-30.

⁹ René De La Pedraja, *The Rise and Decline of U.S. Merchant Shipping in the Twentieth Century* (New York: Twayne Publishers, 1992), 73-78.

¹⁰ De La Pedraja, *Dictionary of the U.S. Merchant Marine*, 25-30.

¹¹ De La Pedraja, *The Rise and Decline of U.S. Merchant Shipping*, 76-77.

profitable passenger service. In addition, their turbine engines were designed for higher speeds: at sixteen knots they wasted fuel and produced excess power.¹² In 1934, despite continuing subsidies by the shipping board, the American Export Lines made the decision to cede control to the New York Shipbuilding Company, one of their creditors. That entity retained the consulting firm of Coverdale and Colpitts to assist in the financial restructuring of the company, and appointed William Coverdale, the firm's chief executive, as AEL's president. Coverdale brought with him one of his employees, John E. Slater, to help save the company from bankruptcy.¹³

Slater brought a unique set of skills and a knack for personal networking to AEL that would chart the next two decades of the company's history. Having obtained a degree in engineering from Harvard, he worked for eleven years with the New York, New Haven and Hartford Railroad, and then the New York Shipbuilding Company for four before joining Coverdale and Colpitts in 1929.¹⁴ In addition to being a known quantity to his former employers during the AEL takeover, Slater had firsthand experience of the complexities of maintaining a transportation system, as well as the financial considerations of running one. Once AEL's finances stabilized, Slater had the opportunity to expand the line's transportation offerings in an attempt to improve the company's business model. From 1939 through 1945, Slater directed a subsidiary operation, the American Export Airlines, an airline to South America and Portugal,

¹² De La Pedraja, *Dictionary of the U.S. Merchant Marine*, 213.

¹³ *Ibid.*, 25-30.

¹⁴ John E. Slater, "Economic Considerations in the Design of Future Combination Passenger and Cargo Ships," *Transactions—The Society of Naval Architects and Marine Engineers*. Vol. 52, (1944): 365.

which made a consistent profit during its short lifespan. Only a decision by the Civil Aeronautics Board forbidding shipping companies from owning and operating airplane services, based on a complaint campaign by Pan American Airways, prevented AEL from maintaining an aeronautic branch going into the second half of the twentieth century.¹⁵

Although Henry Dreyfuss never acknowledged the origins of his relationship with Slater in his published writings, his personal hard-copy CV, nicknamed the “Brown Book,” notes consulting, general designs, overall supervision for American Export Airlines’ transoceanic Sikorsky transport planes beginning in 1939.¹⁶ Although only 35 at the time, Dreyfuss had already established his reputation as an industrial designer, with a proven track record of successful transportation designs beginning with interiors for a DC-3 plane for the United Air Lines Transport Company, and continuing with the highly praised *Mercury* and *20th Century Limited* trains for the New York Central System.¹⁷ When Slater slipped him the request to design ships on the back of an envelope over lunch, he was a known quantity with a long-standing professional relationship to both Slater and his company.

Dreyfuss’s entry into maritime-based transportation came at the beginning of the last profitable decade for ocean transport. By 1959, two years after Boeing introduced the 707, the number of people flying to Europe surpassed those who chose

¹⁵ De La Pedraja, *Dictionary of the U.S. Merchant Marine*, 574.

¹⁶ Henry Dreyfuss, Curriculum Vitae or “Brown book,” Henry Dreyfuss Archive, Cooper-Hewitt National Design Library.

¹⁷ Ibid.

to sail, a statistic that never reversed.¹⁸ From 1945 until well into the 1960s, however, ocean liners enjoyed a brilliant renaissance in terms of technology, design, and popular influence. The Second World War introduced millions of people, from soldiers to civilian refugees, to ocean travel during the immense campaigns in the European, African, and Pacific theaters. British Prime Minister Winston Churchill estimated that the transport services rendered by Cunard-White Star's *Queen Mary* and *Queen Elizabeth* alone shortened the conflict by a year.¹⁹ Taking up to 15,000 troops per voyage—over three times their intended capacity—these two vessels alone carried 1.2 million persons over nearly 1 million nautical miles between 1941 and 1945. The political ramifications of the mass transit of allied troops was further acknowledged when the French Line's *Ile de France* was officially commended by the governments of France, Great Britain, and the United States for transport services rendered during the war with a perfect safety record.²⁰

Although a staggering amount of commercial tonnage was lost during the conflict, the major liners of the Allied powers miraculously survived, with the sole exception of the *Normandie*, accidentally set on fire during her conversion to a troop transport and capsized by the overenthusiastic efforts of well-intentioned firemen. Though the large transatlantic liners normally had an automatic corner on the market for transatlantic passengers, their conversion back to civilian configuration was a

¹⁸ Philip Dawson, *The Liner: Retrospective & Renaissance* (New York: W.W. Norton & Company, 2006), 171.

¹⁹ *Ibid.*, 143.

²⁰ Don Stanford, *The Ile-de-France* (New York: Appleton-Century-Crofts, Inc., 1960), 3.

prolonged and expensive process, often taking several years. This left a market void into which many of the smaller American shipping companies, including the American Export Line, gladly stepped. As in the 1920s, AEL was able to purchase surplus government vessels at low cost, quickly convert them to freighter or combination passenger-cargo liners, and sail them on government-subsidized routes. When the second generation of the Four Aces joined AEL's fleet in 1948, they quickly earned a profit for the company by providing demanded passenger berths. Their instant popularity seems to have convinced company executives, including John Slater, who assumed the AEL presidency in 1949 after the death of William Coverdale, to order two express ocean liners, the *Independence* and *Constitution* in 1948.²¹

Despite these boom years, both Slater and Dreyfuss realized the end of profitable transatlantic passenger liners was drawing near. Slater himself publicly stated in 1944 and 1946 that most travellers would switch to airplanes once they became more feasible.²² As a former airline executive, Slater was in a position to know and back up his assertions with facts. To the annual conference of Society of Naval Architects and Engineers in 1944, he explained that during the 1930s, even though plane tickets to destinations in South America and the Caribbean were more expensive than even deluxe accommodation on ships travelling the same routes, passenger air traffic increased dramatically from 1938 to 1941 (when America's entry into World War II largely stopped commercial travel). His predictions for postwar

²¹ De La Pedraja, *Dictionary of the U.S. Merchant Marine*, 27.

²² Ibid., 575.

rates forecast an average cost of nine to ten cents a mile per passenger for air travel that would easily fall to five-and-a-half cents per mile within five years if passenger number increased as expected. Ocean liners, with their larger crews, longer voyages, and higher fuel consumption, would always operate at a higher cost per mile to the passenger.²³ For his part, Henry Dreyfuss referred to jet-powered passenger airplanes as a “new era,” wherein the Atlantic or American continent could be crossed in a matter of a few hours.²⁴ Slater’s solution for the shipping industry was medium-sized combination liners, ships of less than 20,000 tons of displacement with a capacity of only a few hundred passengers and significant cargo-carrying ability. The lower rates they charged passengers would be less affected by the eventual price drop in airline tickets, and cargo would provide an additional source of stable income unavailable to airlines.²⁵ Additionally, the fuel expenses incurred by running the ship at 17-18 knots could be charged to passengers, rather than lessening the profit of carrying cargo.²⁶ Slater’s hope was that these combination passenger-cargo fleets could not only tap into the passenger market while it lasted, but appeal to the residual travellers who preferred sea to air travel in the long term. To sustain American Export Line’s business model for as long as possible, Slater turned to Dreyfuss’s design prowess to make the ships more appealing.

²³ Slater, “Design of Future Combination Passenger and Cargo Ships,” 369.

²⁴ Dreyfuss, *Designing for People*, 129

²⁵ Slater, “Design of Future Combination Passenger and Cargo Ships,” 379.

²⁶ *Ibid.*, 382.

Understanding Dreyfuss's role in the design of these vessels in light of the economic forecast, then, becomes a matter of discussing what the industrial designer had to offer. Most liner interiors of the mid twentieth century were designed by committee. The French line awarded contracts for first-class interiors on their major liners to a variety of celebrity designers and architects, a process adopted by their German and British competitors, albeit with more mixed results.²⁷ The closest any shipping line came to Dreyfuss's role came were the United States Lines ships *America* and *United States*, both of which were decorated by the firm Smyth, Urquhart & Marckwald, albeit well after interior specifications were decided.²⁸ By contrast, Dreyfuss and his firm were involved from the beginning of the design process, to the extent that they established a branch office at Bethlehem Steel Corporation's Shipbuilding Division's yards in Quincy, Massachusetts to oversee the construction.²⁹

Although the boundary between "designer" and "industrial designer" had become more definite by the late 1940s, many of the big picture questions of the field facing Dreyfuss and his colleagues were the same they had considered at the beginning of their careers in the 1920s. Rather than producing aesthetically pleasing products, the mission of the profession was to encourage as many people as possible to buy what they designed. Success necessitated a keen sense of marketing, advertising,

²⁷ Henri Clouzot, "Le Paquebot Ile-de-France," *La Renaissance de l'Art* Vol. 11, No 3 (March 1928): 84; J. Russell Willoughby, *Bremen & Europa: German Speed Queens of the Atlantic* (Espom, Surrey, UK: Maritime Publishing Concepts, 2010), 37; Anne Wealleans, *Designing Liners: a History of Interior Design Afloat* (New York: Routledge, 2006), 120-121.

²⁸ John Maxtone-Graham, *SS United States: Red, White & Blue Ribband, Forever* (New York: W.W. Norton & Company, 2014), 73.

²⁹ S.S. Independence: Interior Design," *Marine Engineering and Shipping Review* Vol. 56, No. 3 (March 1951): 80.

and trendsetting. Well-established cultural institutions had, at various times and in diverse manners, collaborated with commercial enterprises to rise the general level of public taste. Such was the case in 1913, when the Metropolitan Museum of Art held a series of decorative arts and period furniture lectures for the employees of R.H. Macy & Co., so that they would know more than their customers.³⁰ Throughout the latter half of the 1920s, all the big New York Department stores, including Macy's, John Wanamaker's, Abraham & Straus, Frederick Loeser & Co., Lord & Taylor, and B. Altman & Co. mounted exhibitions of modern furniture and home goods, though Lord & Taylor outdid their competitors by importing almost exclusively French furniture and decorative arts for their 1928 show.³¹ In 1929, the Metropolitan Museum had joined the pack with their exhibition "The Architect and the Industrial Arts," which displayed contemporary furniture in room vignettes, much as department stores staged their shows. "The Architect and the Industrial Arts" also referencing the Met's own recently opened period rooms in the American Wing.³²

For some critics, these exhibits crossed the line between cultural enlightenment and commercial hawking. Changes to the home invariably brought with it questions about the kinds of lives being lived there, and the morals guiding them.³³ Marketing radical changes in this realm was seen in some quarters as an effort to reshape the

³⁰ Marilyn F. Friedman, *Selling Good Design: Promoting the Early Modern Interior* (New York: Rizzoli International Publications, Inc. 2003), 13.

³¹ *Ibid.*, 55.

³² Kristina Wilson, *The Modern Eye: Stieglitz, MoMA, and the Art of the Exhibition, 1925-1934*, (New Haven: Yale University Press, 2009), 55.

³³ *Ibid.*, 57.

fundamentals of American family life. Although he was working primarily as a theater set designer until the late 20s, Henry Dreyfuss found himself in the thick of the genesis of the industrial design field. By 1928, he was well regarded enough by department store managers that Macy's offered him a job to redesign some of their products. He declined their offer and its five-figure salary, explaining that redesigning existing products was approaching the process backwards, as well as being expensive and inefficient for the manufacturers.³⁴ Given his high level of awareness in public happenings and prevailing opinion, he was no doubt aware of the ongoing concerns about the commercial overtones of modern design. "Modern" could be a scary word with ambiguous connotations.

Thankfully for his profession, Dreyfuss possessed a knack for communication and public speaking. From the early 1930s until the end of his career, the number of his speaking engagements and journal and newspaper articles grew tremendously from year to year. While he kept a firm grip on practicality throughout his career, his early speeches show a particular concern with allaying the public's fears about modern design. For example, when he addressed the monthly luncheon of Fashion Group, Incorporated on May 1st 1934, he critiqued "modern" designers as not being familiar enough with "what the antique has to contribute" to the process. The combined knowledge of centuries of experience, to his mind, had produced a body of work whose efforts should not be ignored. "Our furniture," he declared, "may be of tubular metal, but I want to take a side glance at a Chippendale masterpiece, for whether you

³⁴ Russell Flinchum, *Henry Dreyfuss, Industrial Designer: the Man in the Brown Suit* (New York: Rizzoli International Publications, Inc., 1997), 30.

like its detail or not, in proportion and comfort and beauty of line he excels.”³⁵ In a radio advertisement on the Rex Cole Mountaineers show a month earlier, he declared “design has come into our home through the back door.” The radicalism of modern design, he pointed out, might not have sat well with consumers in the living room, but it was quickly and fully accepted in the serviceable areas of the house—kitchens and bathrooms—where it could make life appreciably easier.³⁶ Dreyfuss’s goal, in this instance designing a new refrigerator, was to combine utility with modern aesthetics to reduce the uncertainties associated with the new and unfamiliar. As he put it to an audience in 1933, if “the artist in his ivory tower lives above the multitude, the industrial designer takes the elevator to the ground floor.”³⁷

The accessibility of industrial design remained Dreyfuss’s preoccupation through to the 1950s. As he put it: “if the point of contact between the product and the people becomes a point of friction, then the industrial designer has failed.”³⁸ One of the ways to keep his designs grounded was to keep human factors involved in every stage of the design. The human anatomical size charts nicknamed “Joe” and “Josephine,” mentioned in the introduction, were not only efforts to understand anatomy, but also to see the connections between human engineering and psychology.

³⁵ Henry Dreyfuss, “Lecture to Fashion Group, Inc.” (lecture, Fashion Group, Inc., New York, May 1, 1934), Henry Dreyfuss Archive, Cooper-Hewitt National Design Library.

³⁶ Henry Dreyfuss, “Speech on ‘Rex Cole Mountaineers’” (speech, “Rex Cole Mountaineers” radio program, March 29, 1934), Henry Dreyfuss Archive, Cooper-Hewitt National Design Library.

³⁷ Henry Dreyfuss, “Boston Lecture” (lecture, Boston Chamber of Commerce Design Clinic, Boston, MA, 1933). Henry Dreyfuss Archive. Cooper-Hewitt National Design Library.

³⁸ Dreyfuss, *Designing for People*, 24.

The psychological considerations behind Dreyfuss's designs were the hallmark of his approach. Even when he was convinced of the utility of his own approach, he never sought to shove it down the throats of consumers. His motto covered not just pre-existing products, but ideas that even he came up with himself and which proved less than successful. In the late 1940s, for example, he came up with the idea for another refrigerator model fitted with revolving shelves, much like a Lazy Susan corner cupboard. Although he was delighted with the prototype housed in his kitchen, which he kept organized "like a filing cabinet" and in which he could always easily find his favorite cheddar cheese for midnight snacking, his housekeeper was not impressed. He was taken aback to discover that she preferred the older model, as she could automatically reach for the butter, milk, eggs, and other staples she had kept in the same spot for years. GE turned out to be equally dubious, although a few years later they introduced a refrigerator with shelves that only made a half turn that met most of the objections.³⁹ From resistance like this, Dreyfuss realized that new ideas might be going against years, if not centuries, of ingrained habit or studied efficiency. Creating a systematic process required considerable thought and effort, and suddenly introducing a completely new way of doing things demanded testing and redesign. A successful transition also needed empathy and patience while the previous process was un-learned. Change, though it would come, was best introduced gradually.

Overcoming the force of habit, Dreyfuss recognized, often requires an understanding of *why* the habit exists just as much as *how* it can be changed. Deep-seated psychological considerations of human behavior surface in interactions with

³⁹ Dreyfuss, *Designing for People*, 202.

objects, their environment, and the tasks they perform in them. Though he furthered the field of industrial psychology with a particular emphasis on design, Dreyfuss did not establish the relationship between the two. Dr. Frederick W. Taylor established the initial link in 1911 upon his publication of *The Principles of Scientific Management*. Lillian Moller Gilbreth, the first person to ever be granted a doctorate in industrial psychology, refined Taylor's precepts by acknowledge the power of the human psychology in the industrial workplace. Her book *The Psychology of Management*, in part a constructive critique of Taylor's principles, explored the connections between psychology and human processes and tasks with a particular emphasis on managerial empathy within the work process.⁴⁰ Gilbreth posited that the key to successful management lay with the human individual, and adapting equipment, materials, and methods to suit the individual circumstances of labor.⁴¹ By defining and quantifying success, her findings provided actionable data for both managers and workers, allowing a more productive relationship between the two.⁴² It is interesting to note that

⁴⁰ Published in 1915, *The Psychology of Management* was actually the result of Gilbreth's first, unsuccessful attempt to seek a doctorate at the University of California. A mother of five at the time (she would eventually bear thirteen children), Gilbreth did not meet the residency requirement for the University. She achieved a doctorate on her second attempt, from Brown University in 1915. Along with her husband Frank Bunker Gilbreth, Dr. Gilbreth was a pioneer in time-and-motion studies, as well as fatigue studies, a forerunner of the field of ergonomics. Julie des Jardins' biography *Lillian Gilbreth: Redefining Domesticity* (Boulder, CO: Westview Press, 2013) summarizes Dr. Gilbreth's work, and attempts to disentangle her early work from that of her husband, as some of her writing and research was published under his name. Famously, the couple's research and family life was recounted by their children Ernestine Gilbreth Carey and Frank Gilbreth in *Cheaper by the Dozen* (Chicago: Dramatic Publishing Company, 1948), although Dr. Gilbreth's professional efforts outside the home were minimized.

⁴¹ Lillian Moller Gilbreth, *The Psychology of Management: The Function of the Mind in Determining, Teaching and Installing Methods of Least Waste* (New York: The Macmillan Company, 1921), 3-4.

⁴² Ibid., 6-7.

the fundamentals of scientific management were only developed long after business corporations in America had achieved the capacity for system building. Industrial psychology met the need for researching better methods of managing large numbers of people for a diverse array of tasks.

Two specific elements from Dr. Gilbreth's and her husband's writings during the 1910s speak to Dreyfuss's studies undertaken two decades later: the balance between viewing workers as units versus individuals, and the implications of fatigue study. The introduction of the concept of the worker-unit was Lillian Gilbreth's main critique of Frederick Taylor's theory of scientific management; she allowed for individual difference of skill and capacity. On a semantic level, her term "worker unit, possessed of special characteristics" acknowledged the likeness within the many, but also acknowledged possessing appreciable differences.⁴³ The capacity of workers for deviations from the norm would always be present in any attempt to scientifically summarize the human element of the workforce, but managers could always understand them in relation to the similarities of the workforce as a whole. This refinement allowed a manager to tailor workplace condition for maximum efficiency based on the common characteristics of the entire workforce, with as minimal disruption as possible from the special characteristics of each individual.

The Gilbreths noticed also noticed workers were all prone to decreasing efficiency over time due to fatigue. One of their revolutionary research pursuits was in the area of fatigue study, which became an important component of the couple's

⁴³ Gilbreth, *The Psychology of Management*, 21.

groundbreaking motion studies.⁴⁴ Though their findings were numerous and varied, the concept of “suitability” became the most relevant of their findings to Dreyfuss’s later work. To begin with, the Gilbreths separated fatigue into two different types: necessary fatigue resulting from work that has to be done, and unnecessary fatigue from the needless expenditure of effort on nonessential elements of the task.⁴⁵ Unnecessary fatigue could be reduced by creating a work environment that reduced motions needed. In an earlier publication, *Motion Study*, Frank Gilbreth drew upon his background as a bricklayer to illustrate ways of reducing unnecessary fatigue from repetitive motions. Keeping the bricks to be laid on a bench raised twenty-four inches above the level of the worker’s platform or providing a handhold to help the worker distribute his weight when he bent down to pick up a brick, allowed the worker to lay bricks at a faster rate for longer than if he had to bend all the way to the ground with no support.⁴⁶ In *Fatigue Study*, the Gilbreths expanded this finding to all sorts of environments and equipment, from spare and streamlined hospital operating rooms to flat-topped business desks.⁴⁷ They also included a prescient acknowledgement of the commercial implications of suitability: “Our whole idea of ornament is changing... The new doctrine will interest the selling department, who act as intermediaries

⁴⁴ Julie Des Jardins, *Lillian Gilbreth: Redefining Domesticity*, Lives of American Women (Boulder, CO: Westview Press, 2013), 88.

⁴⁵ Frank B. Gilbreth and Lillian M. Gilbreth, “Fatigue Study,” in *The Writings of the Gilbreths*, ed. William R. Spiegel and Clark E. Myers (Homewood, IL: Richard D. Irwin, Inc., 1953), 306.

⁴⁶ Frank B. Gilbreth and Lillian M. Gilbreth, “Motion Study,” in *The Writings of the Gilbreths*, ed. William R. Spiegel and Clark E. Myers (Homewood, IL: Richard D. Irwin, Inc., 1953), 160-61.

⁴⁷ Gilbreth and Gilbreth, “Fatigue Study,” 316.

between the manufacturing department and the public who is to buy the product.”⁴⁸ The form of a product, lacking the applied and molded ornament of the Victorian era, was beginning to be viewed as aesthetically pleasing in its own right, because it was the most suitable for its purpose.⁴⁹ When compared to Dreyfuss’s later language on the suitability of his “back door” design, where the form reflected the function, the Gilbreth’s observations seem particularly modern. Their research into human interaction with objects and the environment paved the way for Henry Dreyfuss’s testing of his products.

One of the key selling points of Henry Dreyfuss & Associates from the 1930s onwards was the in-house testing and research procedure for new products. Some of this was based on surveys of the consumer base, conducted in coordination with outside trained professionals, but most of it was first hand experience on the part of the design staff, including Dreyfuss himself. In keeping with his empathetic approach, they often found themselves in all sorts of odd situations during the course of their work, from shadowing airport control tower staffers to wearing hearing aids for a day.⁵⁰ One of the most visible of Dreyfuss’s commissions, in terms of number of units manufactured and clients reached, was for the Bell Telephone Laboratory: by 1955, the company provided service for over forty-one million of America’s fifty-odd million telephone connections.⁵¹ The key feature of Dreyfuss’s work was that it fit the

⁴⁸ Gilbreth and Gilbreth, “Fatigue Study,” 316-17.

⁴⁹ Ibid.

⁵⁰ Dreyfuss, *Designing for People*, 64-66.

⁵¹ Ibid., 101.

proportions of the human face much better than Bell's previous models while meeting all the mechanical needs of a telephone in a smaller unit.⁵² Even with the unprecedented success of his 302 model of 1937, by 1946 Dreyfuss and Bell were at it again, seeking to improvements for the upcoming 500 model.⁵³ They paid special attention to perfecting the handset's relationship to the human body. Research showed that a rectangular cross-section of the handset was easier to hold and less prone to turning in the hand than the 302's triangular shape, and the distance between the mouth and ear pieces was reevaluated based on precise measurements of two thousand human faces kept on file at the Bell Telephone Laboratories.⁵⁴ Even with all this careful research and data, the redesign was an arduous process. By Dreyfuss's reckoning, around 2,500 initial idea sketches eventually reduced to a half dozen. These were followed by full-scale models made of cardboard, then clay, and then sculpted in plaster and lacquered to imitate the final product as closely as possible, and from these the final design was chosen and further refined.⁵⁵

While Dreyfuss and his staff had use of Bell Telephone Laboratory's measurements of the human face, they also had been keeping records of their own research. Thanks to the huge research advances in ergonomics by many people during World War Two, Dreyfuss and his firm were able to compile their information into a single volume of tables and scale drawings in portfolio form, published in 1959 as *The*

⁵² Dreyfuss, *Designing for People*, 104.

⁵³ Flinchum, *Henry Dreyfuss*, 100.

⁵⁴ Dreyfuss, *Designing for People*, 105-106.

⁵⁵ Ibid., 106-107.

Measure of Man: Human Factors in Design.⁵⁶ Although produced long after he had created his major transportation commissions, Dreyfuss described the charts and statistics as a synthesis of thirty years of factual information on human proportions and dimensions, culled from not just the firm's library, but also their collection of "books, pamphlets, clippings and dog-eared index cards" on which they had made notations from sources they could borrow but not keep permanently.⁵⁷ In addition to full-scale anthropometric charts, Dreyfuss summarized his findings on manual controls, pedals, visual displays, auditory and sensory signals, anthropometric conformity, safety, and illumination. These findings included everything from a list of motions in order of increasing effort, exertion, and time of operation to a brief summary of color psychology for the American work environment.⁵⁸ As with any large project, it was the result of time and previous findings, and his transportation commissions for airplanes, trains, and ships provided essential experience for the material synthesized in *The Measure of Man*.

Thus, Henry Dreyfuss's work for the American Export Lines brought the expanding field of industrial design into the business of transportation, using it both as a method for market research and as a problem-solving tool. Both firms were well established, with proven business systems and networks they adapted to the changing

⁵⁶ *The Measure of Man* was updated twice more before Dreyfuss's retirement in 1969, and at regular intervals for the rest of the firm's existence.

⁵⁷ Henry Dreyfuss, *The Measure of Man: Human Factors in Design* (New York: Whitney Publications, Inc., 1967), 4.

⁵⁸ Ibid., 7, 15; This avenue of research would eventually result in the last project of Dreyfuss's career, the *Symbol Sourcebook* of 1972, in which he attempted to organize and codify an easily comprehensible international system of nonverbal visual communication.

economic and technological considerations of the world after the Second World War. What made the relationship so successful and uniquely far-reaching was that it was people-based. Because Henry Dreyfuss and John Slater had a long working relationship, both were better able to understand the other's perspective and the challenges inherent to their positions. As we shall see in the coming chapters, this relationship allowed both Dreyfuss and Slater to communicate better with the companies contracted to build the ship, with the marketing and the press, and ultimately, with their other clients.

Chapter 2

BEHIND THE STREAMLINING

Dreyfuss's principles of design, and its potential in modern life, reached its zenith in his designs for transportation. The return of Americans to civilian life after World War II produced a corresponding increase in leisure travel. Even before the cessation of conflict, John Slater predicted that, as had been the case in the decade before the war, between sixty and seventy percent of the passenger traffic would be American citizens.¹ American Export Lines needed adequate ships to meet the initial wave of demand for passenger berths, and hired Henry Dreyfuss & Associates to oversee their creation. While appealing to popular tastes of the era, Dreyfuss remained as carefully balanced in language and practice to modern design as he had in the 1930s. He eschewed a mindless devotion to modernism for its own sake just as much as he decried the excesses of Victorian kitsch.² Achieving this delicate balance between popular style and enduring function took time and practice. The success of his designs for the American Export Line ships was largely due continuous refinement of design elements and the patience and support of his advocate Slater, still the vice president of AEL. Many of Dreyfuss's approaches echoed the interest in combining gracious design with practicality and versatility that characterized many aspects of

¹ John E. Slater, "Economic Considerations in the Design of Future Combination Passenger and Cargo Ships," *Transactions—The Society of Naval Architects and Marine Engineers*. Vol. 52, (1944): 366.

² Henry Dreyfuss, *Designing for People* (New York: Simon and Schuster, Inc., 1955), 77.

American life in the 1950s.³ Unlike some designers or other domestic life experts, Dreyfuss continued to avoid the spotlight. While increasing his role as a publicist for Henry Dreyfuss & Associates, he still preferred to allow his designs, particularly his first four ships for the American Export Lines in 1948, to speak for themselves. These ships may have been new vessels in the passenger market, but they possessed clear antecedents in Dreyfuss's previous transportation commissions. His work on airplanes and particularly on trains for the New York Central System became proving grounds for his shipboard problem solving.

Designing mass transportation necessitated a shift of purpose and perspective for Dreyfuss and his staff. Instead of a small product, his office created entire mobile environments. Limited by space constraints such as the hull of a ship or the dimensions of a train's passenger car, they reconsidered everything. Appropriately enough for a man enamored of modern technology and progress, Dreyfuss's first transportation commissions focused on one old and one new technology: trains and airplanes. Of the two, airplanes had undergone the most rapid changes. He wrote that on his first flight in the late 1920s, there were no passenger seats, which forced him to sit on mailbags. Things only slightly improved for his first transcontinental flight: wicker chairs were provided, but it was a three-day journey with passengers put up in hotels at night.⁴ By comparison, the early DC-2s and Sikorsky VS-44As on which Dreyfuss first worked seemed proto space-age. Exposure to this radical new method of getting from point "A" to point "B" of technology often proved overwhelming for

³ For representative sample of this approach, see Mary and Russel Wright's *Guide to Easier Living* (New York: Simon and Schuster, 1951).

⁴ Dreyfuss, *Designing for People*, 129.

passengers. Even after a twenty years of commercial air travel, Dreyfuss and his firm observed that new features easily confused travellers who would be perfectly comfortable with stationary, land-based products.⁵ In order to work in a closed, sometimes high-anxiety environment where people are just as preoccupied with their destination as they are with the act of getting there, design had to be obvious and integrated with the function, even, as Dreyfuss conceded, at the expense of originality.⁶

His work for the American Export Airlines, the particular project of John Slater, resulted in a comfortable if predictable passenger space. The American Export Airlines fleet consisted of three Sikorsky VS-44A “flying boats,” which were delivered in 1941. Though powerful for the era, each airplane had a low passenger to crew ratio of 16:11, all accommodated with sleeping berths. Numbers were kept limited partly by the airplane’s size and speed—the four Pratt and Whitney twin row Wasp engines each produced 1,200 horsepower that could propel the plane at a top speeds of only 175 miles per hour. A transatlantic flight from New York City to Lisbon, one of the only European airports accessible to civilian traffic during the early days of World War II, normally took over twenty hours.⁷

⁵ When air conditioning was introduced on the DC-6 airliners, passengers were occasionally caught slipping envelopes into the air-exchange slots above the windows, believing them to be mail slots. Mothers on TWA Constellations would occasionally attempt to tuck babies into the overhead luggage compartments for a nap. (Dreyfuss, *Designing for People*, 71)

⁶ Ibid., 71.

⁷ American Export Lines, Inc. *Year Book, 1941, Compliments of American Export Lines, Inc.*, 1941. American Export Association Collection, The Mariner’s Museum Library.

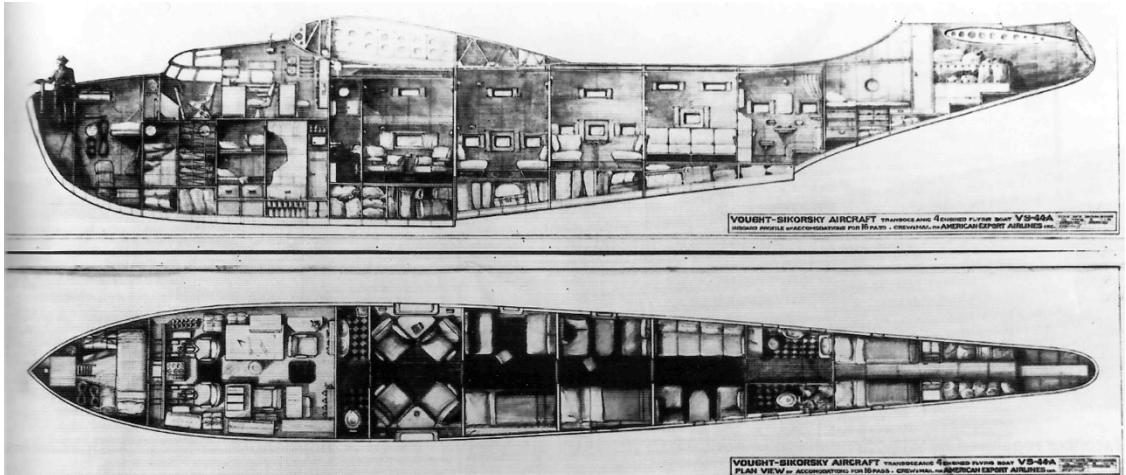


Figure 1: Henry Dreyfuss & Associates, Inboard Profile and Plan views of Vought-Sikorsky VS-44A aircraft. Note the four central passenger compartments. © Igor I. Sikorsky Historical Archives, Inc. 2015. All rights reserved.

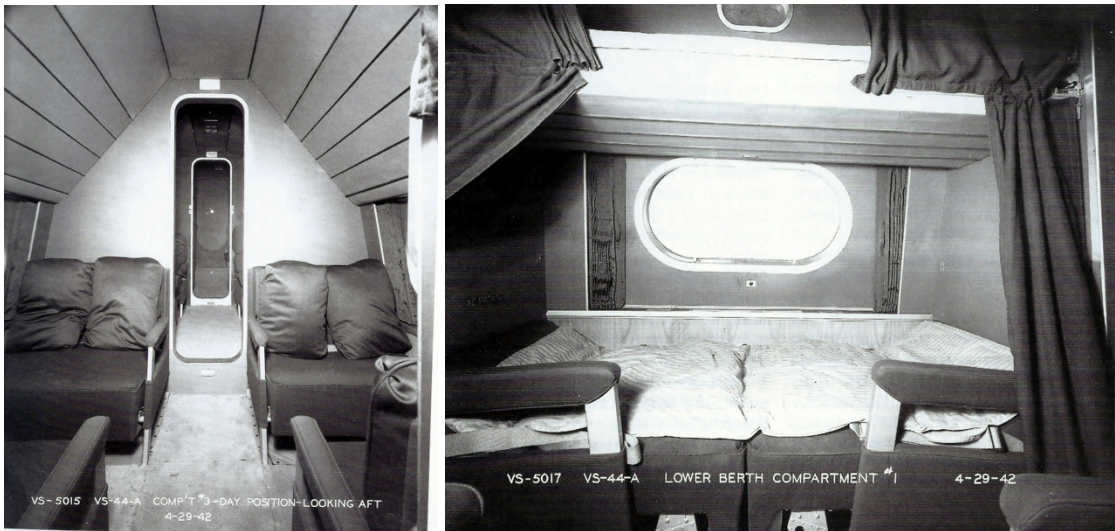


Figure 2: (left) Daytime configuration of passenger compartment on VS-44A aircraft. The sloped ceiling panels conceal upper bearths. © Igor I. Sikorsky Historical Archives, Inc. 2015. All rights reserved.

Figure 3: (right) Nighttime configuration of passenger compartment on VS-44A aircraft. Note the small auxiliary window for the upper berth—these could be seen on the inboard profile in Figure 1. © Igor I. Sikorsky Historical Archives, Inc. 2015. All rights reserved.

The passenger quarters for these aircraft were sparse, but showed many thoughtful touches. Passengers occupied four compartments shoehorned amidships in the plane's yacht-like hull (see figure 1). Each compartment slept four passengers in foldaway bunks, equipped with reading lights and a personal window (see figure 3). The daytime configuration permitted more flexible use of space: the foremost compartment could seat four in luxuriously-proportioned bucket seats, while a four-person couch and two corner chairs made the aft-most compartment into a small lounge (see figure 2). The two central compartments came equipped with bench seats and folding tables for passenger meals. Crew spaces occupied the nose and tail of the aircraft, but could communicate by an internal telephone connection.⁸ These spaces were practical and comfortable rather than luxurious, and remained functional for the rest of the aircrafts' lives, even after American Export Lines ceded control of American Export Airlines in 1945.⁹ The most important result of this commission was the beginning of Dreyfuss's association with the American Export Lines and John Slater.

Although Dreyfuss's designs for airplanes looked to the future, his work on trains, then a much more popular form of transportation, catapulted him to national attention. In the course of his career, Dreyfuss designed three trains for the New York Central Railroad: the *Mercury* of 1936, and the 1938 and 1949 iterations of the 20th

⁸ Harry E. Pember, *Sikorsky VS-44 Flying Boat* (Stratford, CT: Flying Machines Press, 1998), 17; As of 2015, one American Export Airlines Sikorsky VS-44A flying boats, christened "Excambion" by in honor of the 1931 ship, survives in the collection of the New England Air Museum, complete with restored interiors.

⁹ American Export Lines, Inc., *Annual Report—American Export Lines, Inc.*, 1944, 6-7.

Century Limited.¹⁰ Unlike airplanes, he found the railroad cars allowed him and his staff much more flexibility and creativity. There was no need to shoehorn all the necessary functions into one vehicle. Trains provided car-to-car integration of functions, albeit one prone to disruption when fluctuating passenger numbers required adding or removing cars.¹¹ Weight was not a vital consideration as it was for airplanes.¹² Additionally, the stable roadbed permitted unfixed furniture and accessories that would move on airplanes or ships.¹³ These considerations allowed Dreyfuss to play with the balance between function and comfort to provide efficient and economical passenger service.

The challenge for Dreyfuss and his team became accommodating a wider array of passengers demographics, particularly in comparison to the rarified clientele of 1930s air travel. His previous design experience for mass-manufactured articles proved useful, as he believed similar principles applied. Mass transportation, he wrote, is still “used by a mass public, and the industrial designer’s techniques and understanding of the mass mind can be readily applied to transportation.”¹⁴ Designing for this “mass mind” allowed Dreyfuss to treat large groups of people similarly, much

¹⁰ Henry Dreyfuss, Curriculum Vitae or “Brown book,” Henry Dreyfuss Archive, Cooper-Hewitt National Design Library.

¹¹ Dreyfuss, *Designing for People*, 111-112.

¹² Ibid., 130.

¹³ Ibid., 111.

¹⁴ Ibid., 111.

as Lillian Gilbreth defined the workforce in *The Psychology of Management*.¹⁵

Dreyfuss looked to the common denominator of human behavior and sensory experience to create an enjoyable environment. Poor design reduced profits. A poorly planned rail car would drive potential passenger business to the competition. If people felt they were travelling in glorified boxes that existed only to move them from one place to another, they would find a more pleasant solution as soon as possible.

Dreyfuss could not invent a “new” type of train, but he could re-think how passengers experienced train travel.

Dreyfuss’s biggest logistical problem with trains was introducing flexibility to attract the greatest number of passengers across demographic lines. The typical layout of a railroad car, with its central aisle and seats facing in the same direction, possessed no flexibility.¹⁶ Furthermore, it possessed, in Dreyfuss’s words, all the charm of a cabbage patch. For overnight trains, the typical American solution resulted in open berths “reminiscent of opium dens” curtained in bilious green fabric.¹⁷ For his version of the *20th Century Limited*, Dreyfuss sought to introduce flexibility, privacy, and luxury for all passengers, regardless of the size of their traveling party or whether they could afford a luxurious de luxe suite (see figure 23). These principles compliment the train’s reputation luxurious appointments and service.

¹⁵ Lillian Moller Gilbreth, *The Psychology of Management: The Function of the Mind in Determining, Teaching and Installing Methods of Least Waste* (New York: The Macmillan Company, 1921), 21.

¹⁶ For a history of the development of the American passenger railroad accommodation, see John H. White, *The American Railroad Passenger Car* (Baltimore, MD: The Johns Hopkins University Press, 1978).

¹⁷ Dreyfuss, *Designing for People*, 112.

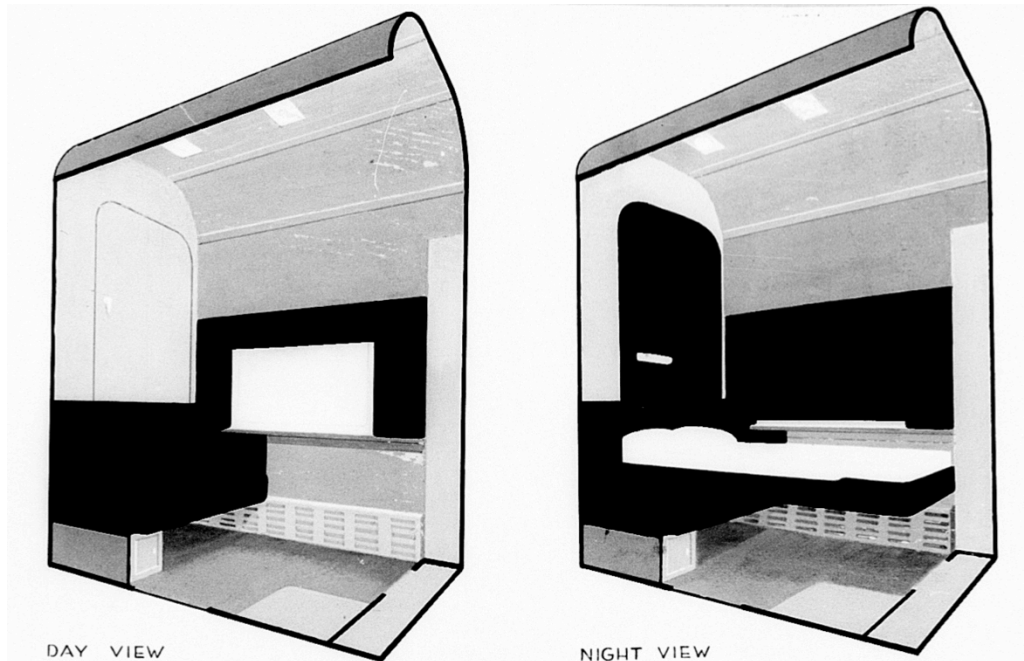


Figure 4: Henry Dreyfuss & Associates. Perspective view of daytime configuration of single-occupancy passenger “roomette” for the 20th Century Ltd. Note the outline of the foldaway bed above the settee. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

Figure 5: Henry Dreyfuss & Associates. Perspective view of nighttime configuration of single-occupancy passenger “roomette” for the 20th Century Ltd. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

Dreyfuss designed the 20th Century Limited as an “all-room” train, with no open berths.¹⁸ For single passengers, he created “roomette” accommodation. Though lacking a private bathroom, it served as a sitting room with an oversized built in chair during the day. A single mattress on a bunk unfolded, murphy-bed style, from the wall to completely transform the space into a bedroom at night.

¹⁸ Russell Flinchum, *Henry Dreyfuss, Industrial Designer: the Man in the Brown Suit* (New York: Rizzoli International Publications, Inc., 1997), 57.

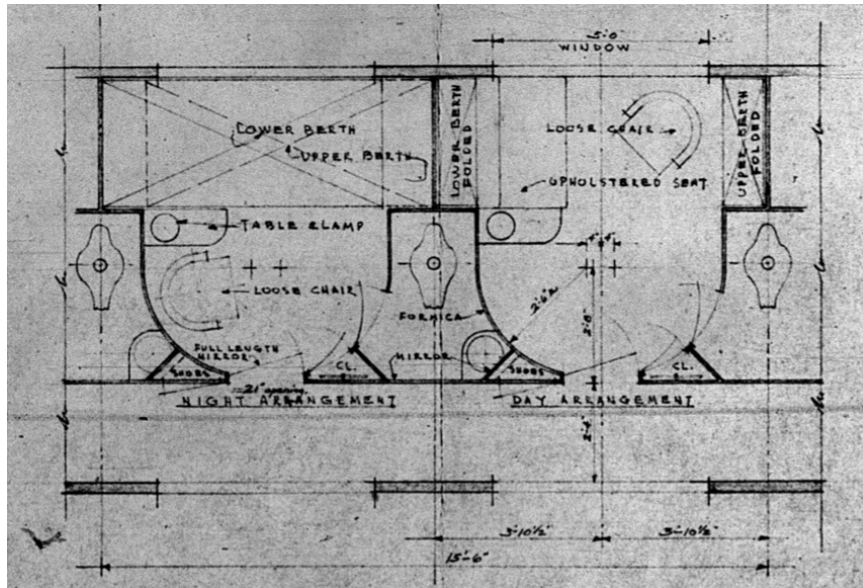
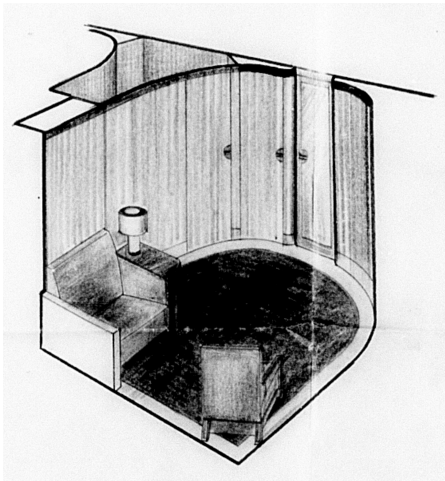


Figure 6: Henry Dreyfuss & Associates. Plans for “Century”-grade double for the 20th Century Ltd. Daytime arrangement is on the right, nighttime arrangement is on the left. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.



Like the roomette, the “Century”-grade accommodation served as a sitting room by day and bedroom at night. The elegant curved apse provided space for a private water closet. Foldaway mattresses on the forward and rear walls created a bunk bed next to the window.

Figure 7: Henry Dreyfuss & Associates. Perspective drawing of “Century” bedroom. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

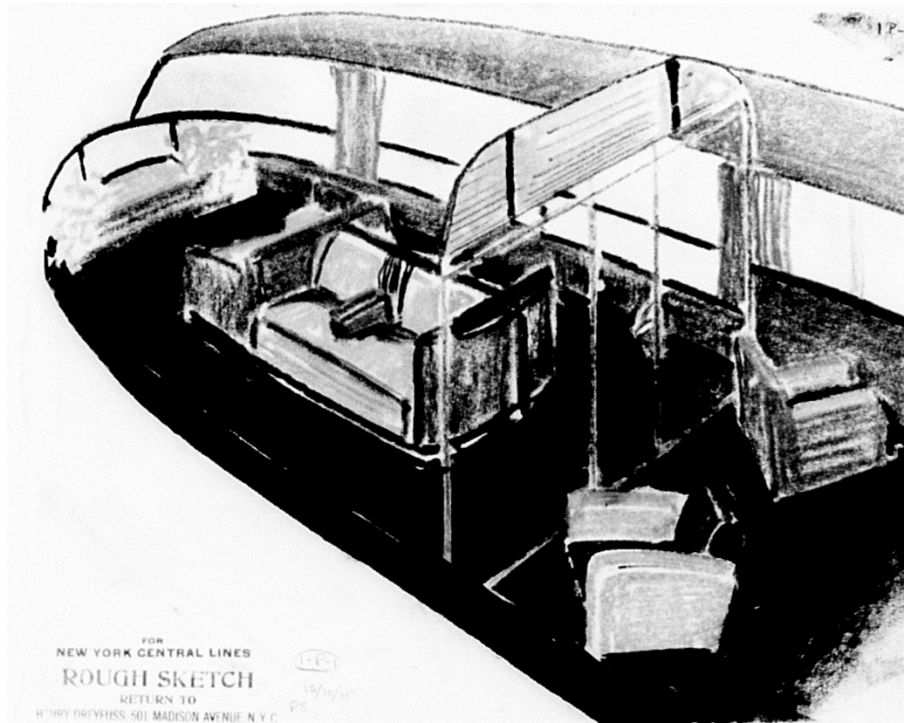


Figure 8: Henry Dreyfuss & Associates. Design sketch for the end of the observation car for the *20th Century Ltd.* Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

For the public spaces, Dreyfuss used the function of each car to dictate its interior layout. In some cases, new approaches were laughably simple. For the observation car—always the last on the train because of its elegant elliptical end—he simply lowered the windows and turned the seating around to face outward towards the windows. Passengers could enjoy the view without risking a crick in the neck.¹⁹

¹⁹ Dreyfuss, *Designing for People*, 121.



Figure 9: Henry Dreyfuss & Associates. View of the bar lounge for the 20th Century Ltd. Henry Dreyfuss (1904-1972). Gouache on paper, 1938. Albany Institute of History & Art, Gift of the New York Central Railroad 1959.130.5.

In the bar lounge, Dreyfuss varied the circulation path to visually and psychologically reduce the space into more manageable and pleasing proportions. Sofas placed perpendicular to the car's length redirected passenger movement, allowing it to briefly pool in a square of open space that felt like it's own enclave. Contrasting colors visually subtracted weight from the extreme ends of the car to reduce its perceived length. In some instances, a mirror placed against the outer wall visually expanded the width of the compartment.²⁰ Dreyfuss selected fine art prints, maps, or murals to relieve starkness blank walls at the end of a long car, a decision so popular it jumpstarted the New York Central System's "Art on Wheels" program.²¹

²⁰ Dreyfuss, *Designing for People*, 121.

²¹ *Ibid.*, 84-85.



Figure 10: Henry Dreyfuss & Associates. End view of the dining car for the *20th Century Ltd.* Henry Dreyfuss (1904-1972). Gouache on paper, 1938. Albany Institute of History & Art, Gift of the New York Central Railroad 1959.130.5.

The dining car introduced some of the most revolutionary new uses of space on the train. Instead of a car full of tables placed perpendicular to the length of the train, Dreyfuss divided the space into smaller units by separating seating areas at either end with glass screens. These spaces could become private dining rooms or waiting areas as required. The dining car could accommodate forty passengers at once in a car that housed both the restaurant space and kitchen. In keeping with Dreyfuss's interest in color, some of the lights contained a small secondary bulb tinted red, which harmonized with the rust-red china and carpeting that was a *20th Century Limited* trademark. Carpets, table linens, menus, china, and even match books and sugar cube

wrappers were all emblazoned with the distinctive “chimney” logo, naturally designed specially by Dreyfuss for the 1938 train.²²

Overall the train possessed the furniture, color schemes, and amenities that passengers expected to find in a posh club or quiet hotel. This had an unexpected effect on the New York Central’s clientele. After the introduction of the trains into regular service, public relations expert Edward Bernays telegraphed Dreyfuss to say: “You have made gentlemen out of travelling salesmen.” This was no slight to the businessmen, but an acknowledgement that the design exerted a positive effect on the passenger experience. The train’s staff found passengers were more gentle on the furniture and surfaces than had previously been the case, as their behavior seemed to reflect their new atmosphere of the cars.²³

Given Dreyfuss’s successful commissions for the New York Central System and American Export Airlines, it’s no surprise that John Slater asked him to work on ships for American Export Lines, Inc. Slater extended the formal offer two years after the Civil Aeronautics Board ordered AEL to divest control of the airline division.²⁴ Despite its brief life span, it had become a profitable venture, and the shipping company would be a major shareholder in the newly independent and renamed American Overseas Airlines until 1950. More importantly, the airline had provided a welcome supplement to the meager passenger numbers the pre-war AEL fleet had been able to accommodate. Even after the inauguration of the first “Four Aces” in

²² Flinchum, *Henry Dreyfuss*, 64.

²³ Dreyfuss, *Designing for People*, 123.

²⁴ American Export Lines, Inc., *Annual Report—American Export Lines, Inc.*, 1943, 15.

1931, the passenger capacity of the entire fleet was just over 5,000 berths per year, 2,500 in each direction.²⁵ To better position the company to capitalize on projected demand for passenger traffic after the conclusion of the war, Slater hired Dreyfuss to work on initial plans for twin liners capable of carrying 1,000 passengers at speeds in excess of twenty-six knots. Work began immediately, although it was subjected to a number of birthing pains. As Dreyfuss wryly observed, “I am afraid we gave them a great deal of apprehension. Our ignorance of sacred cows of ship joinery and lack of respect for tradition... shocked the industry.”²⁶ The firm’s task, at first, was solely the planning and design of passenger spaces, both public rooms and private cabins. As he had with the *20th Century Limited*, Dreyfuss sought to change design features he felt served no purpose. To his surprise, he found shipyard joiners more hesitant to change in work patterns than he anticipated. Maritime construction was steeped in longstanding traditions and practices, which were a source of great pride to its practitioners. Despite his desire to save labor and material, Dreyfuss realized old habits need to be un-learned on a fundamental level. While this process was taking place, disagreements with shipyard personnel assumed comic proportions over the minutest of details. The main argument Dreyfuss recalled was over the joints between panels of marinite (a fireproof calcium silicate compound) that formed the walls of passenger staterooms.²⁷

²⁵ American Export Lines, Inc., *Annual Report—American Export Lines, Inc.*, 1944, 6.

²⁶ Dreyfuss, *Designing for People*, 125.

²⁷ “Machinable Calcium Silicate Non-Combustible Panels,” AWMCO Incorporated, accessed February 7, 2015, <http://www.awmcoinc.com/marinite.php>.

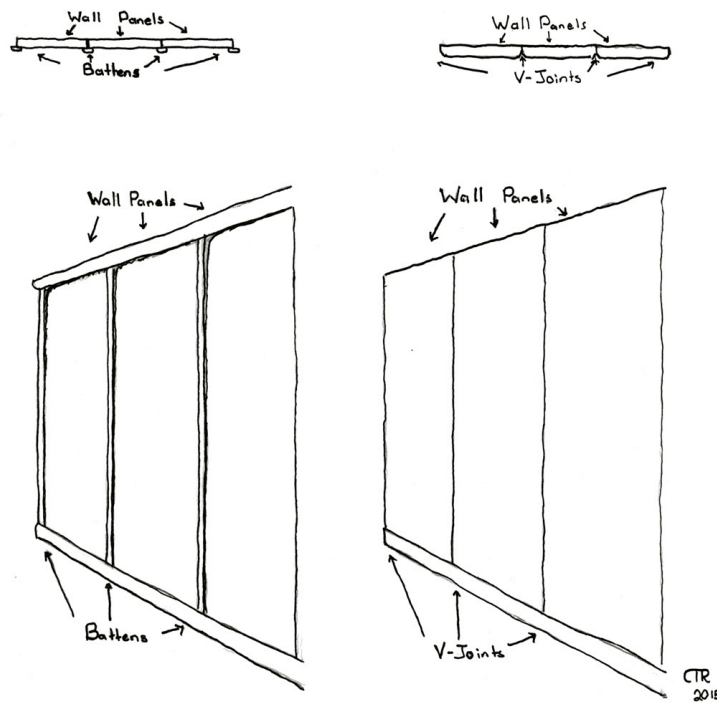


Figure 11: Drawing showing the structural and visual difference between battened and un-battened partitions. Drawing by the author.

Dreyfuss insisted that joints between wall panels be left exposed rather than covered with the customary battens or molding. Though traditional, battens required a significant investment of materials and labor, and produced a busy effect on the wall surface that made the room appear smaller. Though Dreyfuss eventually won the argument, he quickly realized it was wasted effort. After several months of work, and the completion of roughly two-thirds of the drawings, a disagreement arose between the government and American Export Line, and the project for two large liners was tabled for several years.²⁸

²⁸ Dreyfuss, *Designing for People*, 125-126.

Dreyfuss and his staff turned this setback into an opportunity to rethink their strategy in communicating their design ideas and practice on a more manageable maritime project. With the end of World War II in 1945, AEL regained control of its fleet and began to replace losses. Three of the original Four Aces launched in 1930 and 1931 had been sunk during the course of the war, and it was simply easier for the company to start afresh rather than replicate the missing three for a matched quartet that would have ensured balanced service.²⁹ As it had done during the 1920s and 30s, it found a ready source of tonnage in government surplus vessels: in this case four Windsor-class attack transports—the *Dauphin*, *Dutchess*, *Queens*, and *Shelby*—launched in 1944 as part of a makeup for the shortfall in tonnage for the invasion of Sicily.³⁰ As had also been the case during the Depression, this purchase turned out to be something of a sweetheart deal for the American Export Lines. To convert the USS *Queens* into the second SS *Excambion*, for example, cost AEL \$1,100,387, about a third of the vessel's original cost of \$3,146,293 to the government.³¹ Bethlehem Steel Company, which had originally built the four transports, submitted the winning bid for the conversion project.

As with an airplane, the space onboard a ship is strictly limited by the envelope of the hull.³² Within that limit, however, the configuration possibilities are limited

²⁹ Stephen Curley, *The Ship That Would Not Die: USS Queens, SS Excambion, and the USTS Texas Clipper*, College Station, TX: Texas A&M University Press, 2011), 5

³⁰ Ibid., 7, 69.

³¹ Ibid., 67.

³² Only within the past thirty years, with the advent of modular dry dock construction, has it been possible to expand the hull itself. For a layman's description of this process, see Chapter 2 of John-Maxtone-Graham *Liners to the Sun* (Dobbs Ferry, NY: Sheridan House, Inc., 2000), 12-51.

only by budget and the vision of the naval architect. The conversion process Dreyfuss observed for the Four Aces doubtless appealed to his innovative streak. Bethlehem Steel sought to fulfill a tall order: turn four transports for 2,500 military personnel into vessels carrying 125 passengers and an equal number of crew, as well as 400,000 cubic feet of freight and another 30,000 cubic feet of refrigerated cargo.³³ To accomplish this, they rebuilt the freighters from the inside out. Engineers removed the superstructure above the main deck and all military fixtures. With the exception of the housing for boilers and propulsion machinery, they also completely reconfigured all decks and bulkheads within the hull. The level of the boat deck was raised six inches to provide more satisfactory passenger spaces on the promenade deck, while the hold deck amidships was lowered by seven inches to make just enough room for low-ceilinged orlop decks at the bow and stern for refrigerated cargo between the hold deck and C deck.³⁴ Enlarged cargo hatches and lengthened cranes and kingposts eased cargo handling, while new funnels and radar masts increased functionality for exhaust evacuation and navigation while improving the overall look of the vessels.³⁵ While the work did not change the vessels' overall gross tonnage or displacement, it essentially resulted in an entirely new ship. Though Dreyfuss's work on the Four Aces focused only on the passenger quarters, his account of later work on the *Independence* and *Constitution* in 1951 exhibited just as much concern for the accommodation of hotel

³³“American Export Lines to Ask Bids Shortly for Reconversion of Four Vessels,” *Marine Engineering and Shipping Review* Vol. 52, No. 4 (April 1947): 132.

³⁴ “American Export Lines’ New Excalibur,” *Marine Engineering and Shipping Review* Vol. 53, No. 10 (October 1948): 40-43.

³⁵ Curley, *The Ship That Would Not Die*, 70.

services, such as plumbing lines and air conditioning ducts, and the efforts to streamline labor for the crew. If Dreyfuss was not directly involved with the structural reconfiguration of the Four Aces service and crew space, he must have kept a close watch on the process and took notes.

The American Export Lines apparently limited Dreyfuss's task of designing the passenger quarters of the Four Aces to the furnishing and decoration of predetermined spaces rather than designing a new layout. As with many combination passenger-cargo liners, the fore and aft ends of the vessels were dedicated to the business of loading and storing freight. Passenger quarters occupied the amidships space on "B" and "A" decks, the entirety of the promenade deck, and large swaths of the boat and sun deck dedicated to deck games and sun bathing. The room count totaled 45 passenger staterooms, the embarkation foyer, the lounge, restaurant, and smoking room, as well as service areas such as the barbershop, gift shop, offices, and hospitals. *The Marine Engineering and Shipping Review*, a trade publication that reviewed significant new ships coming into the passenger and cargo trade, described Dreyfuss as designing the interiors "in collaboration with officials of American Export Lines."³⁶ The brief paragraph dedicated to the Four Aces in Dreyfuss's memoirs, the smaller number of surviving microfilmed drawings for the vessels, and the limited description of his role in the *Marine Engineering and Shipping Review* articles all suggest a project of fairly limited scope. As John Slater did not assume the presidency of American Export Lines until 1949, the year after the inauguration of the "Four Aces," it's likely that competing visions of the company's leadership limited the full

³⁶ "American Export Lines' New Excalibur," 43.

range Dreyfuss's vision. Nevertheless, he cheerily described the experience as an opportunity to use the vessels as an "experimental laboratory" in the hope that work would eventually resume on the two larger vessels.³⁷ As "practice runs," these vessels were remarkably successful and pioneered design research techniques that are now standard in the cruise industry.

Comparing Dreyfuss's work to the previous quartets of the Four Aces shows how and where he chose to innovate. The two generations of vessels were of similar size and passenger capacity, but the earlier interiors and layouts reflected the inherently conservative designs still common in ocean-going vessels during the Great Depression.³⁸ Public rooms abounded in ivory-painted colonial revival architectural details such as door pediments, acanthus brackets, and classical columns. Potted palms and wicker furniture alternated with reproduction antiques—each cabin was fitted with "a dressing table with the trim lines of the French commode, and above, a mirror with the pleasant influence of the Queen Anne period" (figure 13).³⁹ That the dining salon's chairs showed more than a touch of the simplified lines of Art Deco detailing did not, apparently, strike anyone as anachronistic in a "Colonial" space (figure 25).

Dreyfuss's interiors for the 1948 Four Aces, by contrast, embraced an aesthetic that possessed a spare, almost timeless quality while maintaining links with its mid-century era (figure 24). The overwhelming ostentation of larger ocean liners was

³⁷ Dreyfuss, *Designing for People*, 126.

³⁸ René De La Pedraja, *A Historical Dictionary of the U.S. Merchant Marine and Shipping Industry Since the Introduction of Steam* (Westport, CT: Greenwood Press, 1994), 213-14.

³⁹ American Export Lines, Inc., "Yankee Cruises De Luxe to the Mediterranean," (New York: Promotional Brochure, 1934).

countered with a series of small, multi-use public rooms that embraced the functional and structural constraints imposed by the ship. Some considerations involved knowledge of the environmental considerations of sailing on a ship. The two promenade deck suites, for example, were positioned on the starboard side of the ship, which for three seasons of the year gave it desirable southern sunny exposure on outbound trips (see figure 28).⁴⁰ For high summer, the ship-wide air-conditioning system eliminated the possibility that any of the accommodations, particularly on the southern side, could become stuffy. Unlike the designers of the 1930 Four Aces, who had sought greater ceiling height through clerestories or balcony overlooks, Dreyfuss accepted the low ceiling heights. He also kept the rooms smaller to reduce the necessity for intrusive stanchions that would need covering. His office specially designed all the furniture with rounded corners to prevent injury in rough seas.⁴¹ Colors stayed neutral, favoring navy blue, brown, tan, and gray, with occasional accents of brighter colors on pieces of statement furniture or in the specially commissioned artworks on board.⁴² The *Marine Engineering and Shipping Review*, while generally positive about Dreyfuss's work, did include one aside he must have found humorous: "An interesting feature is that these bulkheads are constructed without face pilasters. Only a small V joint is visible between panels, giving a flush surface which has the effect of making the rooms appear larger." His insistence on no wall battens had paid off.

⁴⁰ Curley, *The Ship That Would Not Die*, 78.

⁴¹ Dreyfuss, *Designing for People*, 127.

⁴² "American Export Lines' New Excalibur," 40-43.

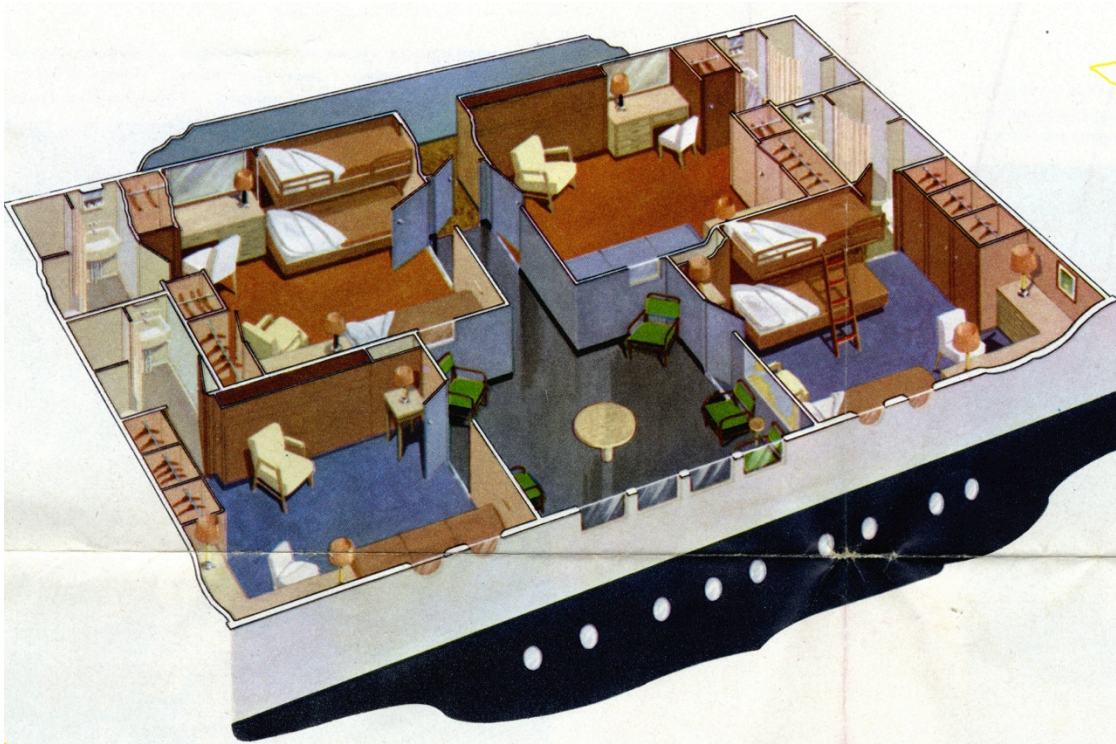


Figure 12: American Export Lines, Inc. Diagram of a “Verandah Suite” for the 1948 Four Aces. showing the arrangement of multiple staterooms around a central sitting room. “The 4 Aces: Excalibu, Exochorda, Exeter, Excambion.” Maritime Ephemera Collection of Christian Roden.

Most of Dreyfuss’s efforts focused on the passenger staterooms, and these reflected his prior experience designing trains and airplanes. On the Four Aces, the staterooms followed the formula developed by the AEL in the 1930s, particularly in regard to the veranda suites.⁴³ Soon after their introduction in the 1930s, these suites became the company’s signature cabin arrangement and were marketed to families or groups of friends—although the space could be shared by strangers were no large

⁴³ Likely another indication that Dreyfuss’s design team did not have as much of a say in the layout of the passenger spaces as they did for the later *Independence* and *Constitution*.

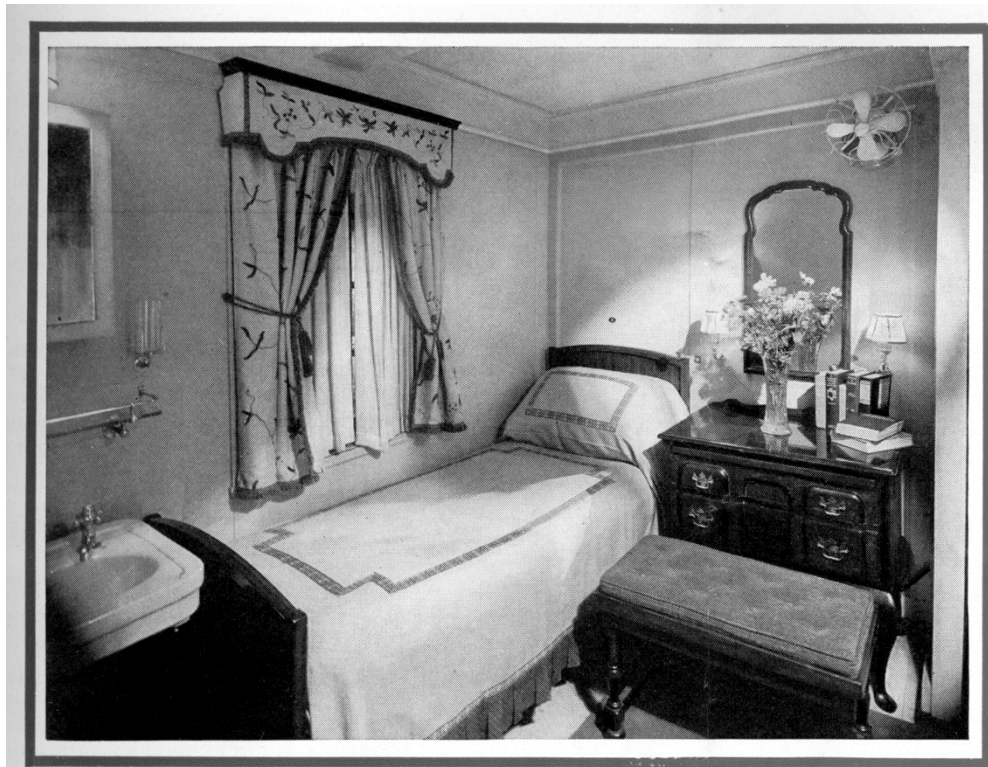
groups present on a voyage.⁴⁴ A door from the main passageway opened onto a central, enclosed room with large rectangular windows piercing through the hull plating, allowing for expansive and breathtaking views of the passing seascape and scenery during the voyage. Furnished with a central table and several chairs, the verandah functioned as a hybrid sun porch and sitting room, accessible to the occupants of the adjoining cabins and any guests they admitted. The connecting passenger staterooms, with attached baths, could only be accessed through the veranda. Only two cabins abutted the hull's shell plating that permitted portholes. The inner cabins had windows onto the verandah and its large windows, allowing AEL to declare all passenger cabins to be "exterior," though in a gesture to reality the inner cabins did command a somewhat lower price.⁴⁵

The verandah staterooms on the 1930s Four Aces possessed a very distinct public/private dichotomy. The verandah was intended for the "sitting room" and the individual cabins only as bedrooms. All passenger staterooms on the 1930s Four Aces were designed according to a "guest-room premise" featuring "all the amenities dispensed to a guest by a liberal host."⁴⁶

⁴⁴ "Yankee Cruises De Luxe to the Mediterranean,"; American Export Lines, Inc., "The Aces," (New York: Promotional Brochure, 1961).

⁴⁵ Curley, *The Ship That Would Not Die*, 73.

⁴⁶ "Yankee Cruises De Luxe to the Mediterranean."



PROMENADE SINGLE STATEROOM—Similar to S5-S6

Figure 13: American Export Lines, Inc. Single-occupancy stateroom on the Four Aces, c. 1934. “Yankee Cruises De Luxe to the Mediterranean.” Maritime Ephemera Collection of Christian Roden.

This somewhat puzzling metaphor translated into freestanding metal frame beds, wardrobe cabinets, an attached full bath or sinks with hot and cold running water, and all accessories (including a thermos and glasses that would be filled nightly with ice water by the steward) in addition to the aforementioned French commode and Queen Anne mirror for “the feminine member.” Presumably the masculine member was relegated to the more utilitarian mirror over the sink (see figure 13). Images of this cabin, showing the panel battens that so distressed Henry Dreyfuss, could easily be mistaken for a hotel bedroom. Furnishing plans for the 1930s Four Aces show that only the largest cabins possessed dedicated seating in the form of a sofa. Extra passengers could occasionally be accommodated in what marketing literature referred

to as a “Pullman Berth,” a foldaway upper bunk bolted to the wall above a bed or sofa. The underside was usually paneled to resemble a cabinet, though its presence in the cabin was unmistakable.

Dreyfuss’s cabins took a different approach that echoed his railroad designs, and in which his research and prototyping techniques developed in the 1930s unquestionably proved his worth to the American Export Lines. As with all forms of transportation, space represented money. Cabins were by far the most important factor in a passenger liner’s money-making capacity. They were the passenger’s home territory for the duration of a voyage, and the subject of constant discussion, comparison, and analysis. As maritime historian and travel veteran John Maxtone-Graham points out, memories of an awkward layout or insufficient storage seem to linger longer than positive recollections of an exotic destination or a good meal.⁴⁷

To develop cabin designs, Dreyfuss’s firm rented a former stable that they had somehow found on a quiet side street in New York City. In its apparently vast floor space, they constructed eight full-scale mockups of staterooms to correspond with every cabin layout that would appear on the ship. They were, Dreyfuss later remembered, complete to the last detail, down to the light switch and telephone placement. Not content just to determine the exact layout in advance, the firm invited a variety of “guinea pig travellers,” requesting each to pack for a voyage of a certain length, from a weeklong transatlantic crossing up to a three-month cruise, and then asked to unpack and settle into the cabin. Once these passengers were ushered into the faux cabins, employees minutely observed and recorded their unpacking habits. They

⁴⁷ Maxtone-Graham, *Liners to the Sun*, 235.

adjusted observed inconveniences. Further tests by these stationary travellers helped designers fine-tune plans. The process took patience: photographs of the model cabins began appearing in the American Export Lines annual report at the end of 1946, well over a year before the first of the ships was delivered (see figure 29).⁴⁸ Differences in the types of furniture and bedding and their arrangement in the predetermined cabin layouts hint at the evolutionary nature of these mockups. Building eight full-scale cabins was an expensive proposition, but far cheaper than after-the-fact corrections to forty-five passenger cabins per vessel, particularly those involving rewiring outlets or making adjustments to the tiled bathrooms, after at least one season of dissatisfied clientele until the ship's routine dry docking when such work would have to take place.⁴⁹ AEL later donated these rooms to the Maritime Service Training Station at Sheepshead Bay, Brooklyn, where they served as training spaces for new stewards until the facility's closure in 1954.⁵⁰ New crewmembers in the hotel department would then come aboard with a practical as well as theoretical knowledge of their duties.

Dreyfuss's staterooms were masterpieces in the innovative use of space. The mantra he adopted was "suite amenities for cabin prices."⁵¹ Every stateroom had two configurations: as a daytime sitting room, and as a nighttime bedroom. In the cabin's daytime mode, the manner in which passengers would have first experienced the cabin upon boarding, there was no bed to be seen. The stationary beds AEL literature

⁴⁸ American Export Lines, Inc., *Annual Report—American Export Lines, Inc.*, 1946, page 9.

⁴⁹ Dreyfuss, *Designing for People*, 69-70.

⁵⁰ Curley, *The Ship That Would Not Die* 69.

⁵¹ American Export Lines, Inc., "The 4 Aces: Excalibur, Exochorda, Exeter, Excambion," (New York: Promotional Brochure, 1953).



Figure 14: American Export Lines, Inc. Illustration of the daytime arrangement of a passenger stateroom. "The 4 Aces: Excalibur, Exochorda, Exeter, Excambion." Maritime Ephemera Collection of Christian Roden.

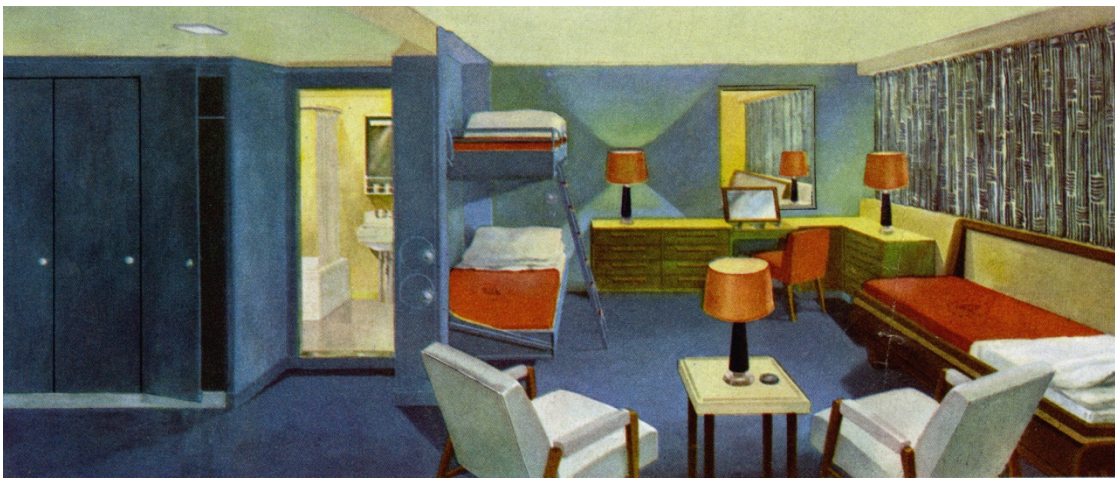


Figure 15: (below) American Export Lines, Inc. Illustration of the nighttime arrangement of a passenger stateroom. "The 4 Aces: Excalibur, Exochorda, Exeter, Excambion." Maritime Ephemera Collection of Christian Roden.

boasted of in the 1930s had been traded for the type of convertible furniture that Dreyfuss had first used on the *20th Century Limited*'s passenger berths. Every cabin featured a full-length sofa, whose back would fold down, bringing with it a full-sized inner-spring mattress seventy-nine inches long by thirty-four inches wide, a good deal

larger than a standard twin bed. The mattress also rested on springs concealed in back of the couch cushion, which allowed for extra comfort in both uses.⁵² Each cabin also featured one or two more berths. Rather than using the visible Pullman berths, Dreyfuss worked with the Hopemann Brothers Company to design a special system that allowed the berths to fold flush against the wall, as they had in the *20th Century Limited*'s sleeping compartments. Balanced by counterweights, the berths rested securely in either position (figures 26 and 27). Their undersides were painted the same color as the wall, and only the thin line between the panels indicated their presence when closed. Stewards, or even passengers themselves, could open the bunks by turning a discreet handle at the end of the wall forming either a set of bunks or an upper berth. The only cabins that had nonconvertible beds were the two promenade deck suites, whose bedrooms housed two twin beds. Perhaps ironically, the full freestanding beds touted as a desirable feature of all American Export Lines cabins in the 1930s had become much more of a luxury symbol on the new liners. These considerations aside, AEL made the convertible nature of these cabins one of the top selling points of the Four Aces throughout their working life. Brochures inevitably featured “day” and “night” shots of an average-sized passenger cabin, whose occupant could host mixed-gendered get-togethers without the awkward and unseemly overtones that may have resulted from the presence of a bed. Privacy between cabins was also ensured by 1¼-inch air gaps between the wall panels of fireproof marinite of adjoining staterooms, which incidentally provided space for cables and electrical junction boxes.⁵³

⁵² “American Export Lines’ New Excalibur,” 44.

⁵³ “American Export Lines’ New Excalibur,” 44.

Although the Four Aces represented several features new to transatlantic passenger ships, they reflected Henry Dreyfuss's previous designs, particularly the *20th Century Limited*. Though he considered these small ships his practice run in preparation for the *Independence* and *Constitution*, he gave them his full attention, and made the effort to understand the qualities of successful passenger boats. Simultaneously, John Slater's and Dreyfuss's relationship took on increasing importance: Slater's ability to take the long view on investing in transport units allowed the designer adequate time to develop and test prototypes of passenger spaces that proved invaluable for market research and crew training. By the time design work resumed on the *Independence* and *Constitution* in 1948, Dreyfuss was well versed in the nature of the maritime passenger market and the challenges endemic to marine design and engineering. Most importantly, he had learned how marine architects and joiners communicated ideas and executed their work, and how to effectively present novel design ideas to them.

Chapter 3

MOVING THE MODERN ENVIRONMENT

By the time the Four Aces debuted in 1948, Henry Dreyfuss & Associates was already hard at work on drawings for the *Independence* and *Constitution*, which had regained government approval in 1947.¹ Compared to the Four Aces, this project was a massive undertaking. Instead of reducing the military capacity of four preexisting freighters from 2,500 to a peacetime occupancy of 250, the American Export Lines, Henry Dreyfuss & Associates, and the Bethlehem Steel Corporation's shipbuilding division joined forces to build the equivalent of two small towns from scratch, housing up to 1,580 passengers and crew for an eight-day Atlantic crossing.² Dreyfuss's relationship to AEL, and hence his role in the project, expanded in 1949. In August of that year William Coverdale, the president who had rescued AEL from bankruptcy in 1935, passed away, and John Slater succeeded him as president and chairman of the Board of Directors. By that point, the line had retained Dreyfuss's services for ten years. The consistent success of his design projects, both air and sea based, had won Slater's respect and trust. For the construction of the *Independence* and *Constitution*, Slater increased Dreyfuss' and his firm's roles beyond anything the fields of industrial design or naval architecture had previously experienced. More importantly, AEL's

¹ Henry Dreyfuss, Curriculum Vitae or "Brown book," Henry Dreyfuss Archive, Cooper-Hewitt National Design Library.

² "The Independence: Principal Dimensions and Data," *Marine Engineering and Shipping Review* Vol. 56, No. 3 (March 1951): 60.

investment in industrial design was much better publicized and subjected to scrutiny both within and outside of the maritime community. The ultimate result of this collaboration between Slater, Dreyfuss and their respective firms produced three important results: a more effective method of communication for engineering and spatial solutions, a use of industrial design as part of a strategy to improve labor and management conditions, and a more flexible attitude to space to better accommodate shifts in passenger demographics.

Devising new solutions for these ships required effective communication. For the duration of the project, all parties maintained close physical proximity for easier access and communication. Dreyfuss's official account in *Designing for People* was perhaps overly modest: he merely mentioned that representatives were present at weekly general and committee meetings between his firm, the Maritime Administration, Bethlehem Steel, and the joinery contractor.³ The *Marine Engineering and Shipping Review*, however, described a much more complex relationship. In their 1951 account, Dreyfuss's firm opened a temporary branch office at the shipyard, to allow for uninterrupted personal communication between the design staff and the joiners responsible for the work.⁴ Office staff dedicated to the project on the management level included a project manager, his assistant, the chief designer, an architect, and a decorator. In addition to these personnel, Henry Dreyfuss Associates provided a "considerable number" of draftsman not just to produce design drawings, but also to check the corresponding drawings produced by the shipyard and joinery

³ Henry Dreyfuss, *Designing for People* (New York: Simon and Schuster, Inc., 1955), 126-127.

⁴ "S.S. Independence: Interior Design," *Marine Engineering and Shipping Review* Vol. 56, No. 3 (March 1951): 80.

shop.⁵ The design office's presence meant that it was present at all meetings throughout the construction process, and able to provide input and receive it from those more experienced in maritime construction. According to the *Marine Engineering and Shipping Review*, it was the first project "in which an industrial designer worked on the preliminary-design plans, and followed through to the end."⁶ Uncharacteristically for the publication, the March 1951 issue was dedicated solely to the upcoming debut of the *Independence*. As the first (and largest) ocean liner built in the United States after the Second World War, the ship garnered an immense amount of press attention. Though the *Review* discussed Dreyfuss's role in the article on interior design, they dedicated paragraphs to his role, rather than the single sentence in their 1948 article on the Four Aces. Dreyfuss's work on the project was even acknowledged by the Bethlehem Steel Company's Shipbuilding Division in their commemorative booklet for the *Independence* and *Constitution*, wherein they praised his "singular talent" without which the ship would not have achieved its finished form.⁷

The *Review*'s coverage of Dreyfuss's role was not limited to the shipyard, but became a platform to communicate his design philosophy to the maritime construction field. Surprisingly, the article discussed his five-point design philosophy, and how each uniquely contributed to the project: safety, convenience, ease of maintenance,

⁵ Henry Dreyfuss, *Designing for People*, 127.

⁶ "S.S. Independence: Interior Design," (March 1951): 79.

⁷ Bethlehem Steel Company Shipbuilding Division, *S.S. Independence, S.S. Constitution: Bethlehem Built* (New York: Bethlehem Steel Company, 1951), 1.

facility of manufacture, and appearance. For example, safety meant the *Independence* and *Constitution* both exceeded the current safety requirements of the Coast Guard and Maritime Administration. Some elements, such as fireproof or fire-resistant materials, were obvious choices standard to maritime construction. Others, such as new research into the height and location of grab bars or rounded corners on all bulkheads and furniture to prevent fall-related injuries, presented new takes on planning for passenger safety and wellbeing. Convenience of use, the second point of Dreyfuss's five, applied on many levels throughout the ship. Ship-wide passenger conveniences included color-coding the corridors by deck, which matched the fobs on room keys to help passengers find their way around the ships. Such considerations aided passenger way finding without the need for calling upon crewmembers, though they would certainly have been available for assistance.⁸ Dreyfuss had used this five-point formula as part of his marketing approach to clients since the 1930s, but changed point four in deference to the enormous size of the project: "sales appeal" became "facility of manufacture." The ultimate purpose of the two, to proclaim "the excellence of its concealed mechanism and the integrity of its manufacturer" was overall the same, though the specific applications differed.⁹ Furnishing the ship, with its hundreds of cabins, dozens of pantries and steward's stations, multiple kitchens, elevators, stairways, and storage lockers, required careful planning to reduce repetitive work to the maximum extent possible. Prefabricated fittings and built-in furniture helped solve the issue to a certain extent, but it also meant extra checking to make sure

⁸ "S.S. Independence: Interior Design," 80.

⁹ Henry Dreyfuss, *Designing for People*, 182.

it would fit everywhere it was intended to go. In the end, the effort paid off, and the job was completed more quickly and with less labor than had previously gone into fitting out a ship of that size.¹⁰

The *Marine Engineering and Shipping Review* also provided an important record of changes in Dreyfuss's communication techniques with the Bethlehem Shipbuilding Division. He learned from the disagreement over the un-battened bulkheads for the Four Aces project, and the amount of time and energy it took and sought more effective methods for communicating with the shipwrights and contractors. Henry Dreyfuss & Associates again turned to their practice of building models and mockups throughout the construction of the *Independence* and *Constitution*. The branch office staff built scale models of the ship's exterior, general arrangements of public rooms, service areas, and staterooms deck-by-deck, and most importantly, quarter-inch scale models of every public room, stateroom type (in addition to the full-scale mockups built and tested by faux-passengers), stairway, and corridor (see figure 16, 19, 30, 31, and 33). The firm used these to initially study different design schemes and plan the general layout of the ship. They also used the models to visually communicate with the engineers and workers building the ship. Rather than working from two-dimensional drawings to visualize three-dimensional space, the shipyard's foremen could see the intended result of their work in miniature. The approach allowed Dreyfuss's team to explain their point of view when opinions differed on non-structural issues.

¹⁰ "S.S. Independence: Interior Design," 80.

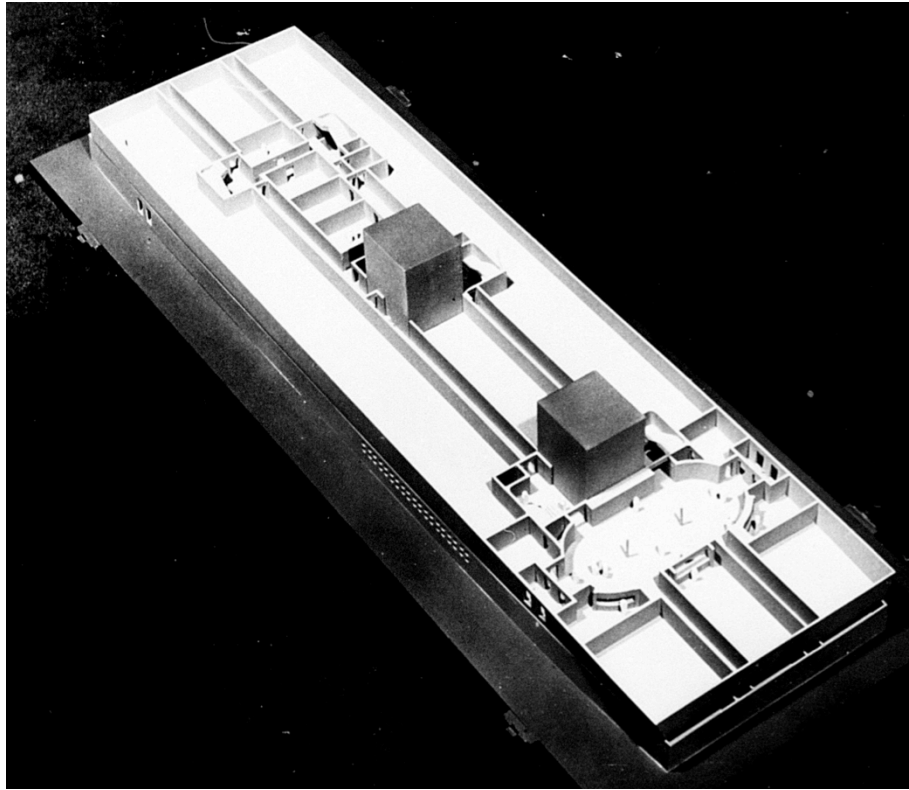


Figure 16: Henry Dreyfuss & Associates. Early model for Main Deck of the *Independence* and *Constitution*. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

The *Review* concluded “these models, in conjunction with drawings, played a significant role in resolving problems and expediting construction, particularly in the early stages.”¹¹ Shipyard personnel also discovered this relationship was symbiotic: design considerations also benefitted their work. Lighting long corridors, for instance, had always run afoul of the ventilation and plumbing lines laid in the space between the ceiling and the deck above.

¹¹ “S.S. Independence: Interior Design,” 80.



Figure 17: Henry Dreyfuss & Associates. View of passenger corridor. Note the subtle joint between wall panels, and the ambient glow from cove lighting developed by Dreyfuss and the marine joiners. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

Dreyfuss's team worked with the naval architects to develop a new solution: a false beam running alongside one side of the corridor (that also accommodated a wire chase) that functioned as an extended cove light (see figure 17). The electricians left the ceiling free of holes that interrupted service ductwork behind the ceiling panels.¹² Dreyfuss's memoirs mention that the American Export Line caught on to his use of his firm's models, using them to advertise the ships' amenities as construction progressed to build customer anticipation about their forthcoming debuts.¹³ Sadly, these models seem not to have survived very long into the 1950s. Though complex and impressive,

¹² "S.S. Independence: Interior Design," 80.

¹³ Dreyfuss, *Designing for People*, 127.

they were construction aids, and neither American Export Lines nor Bethlehem Steel, and certainly not Henry Dreyfuss & Associates, possessed the necessary space for their preservation and storage. After being photographed, they were presumably disposed of—as, eventually, were the original photographs themselves.¹⁴

The authorship of the coverage of Dreyfuss's work in the *Marine Engineering and Shipping Review* is unknown, but bears striking similarities to in content and language to articles penned by Dreyfuss himself. This article does not appear in Dreyfuss's "Brown Book" list of personally written publications. In fact, no mention of this article despite its coverage of his work is made in that record at all. Possibly his office, or even Dreyfuss himself, provided the *Review* with a detailed list of talking points highlighting his design process and accomplishments. Though doubtless approved and possibly vetted by American Export Lines, it marks a surprising, and seldom repeated, shift from previous reviews in its acknowledgement of designers and engineers. The next year, when the crack superliner SS *United States*, which still holds the record for a fastest transatlantic crossing, made her debut, the journal covered the ship in an eight-page review, whereas it had dedicated almost an entire issue to the *Independence*.¹⁵ Some of this puzzling silence might be attributed to the nearly paranoid desire for secrecy on the part of William Francis Gibbs, the *United States'*

¹⁴ Records for Henry Dreyfuss & Associates are held by the Cooper-Hewitt National Design Museum in New York City in the Henry Dreyfuss Archive. Aside from his personal papers and surviving gouache and watercolor drawings, the majority of the firm's sketches, measured drawings, model photographs and design schemes for projects undertaken between 1929 and 1969 survive only in single-copy microfilm records donated to the Cooper-Hewitt National Design museum by the firm from 1969 through the early 1970s. Undoubtedly more information existed at one point, but unless they turn up must be regarded as lost to history.

¹⁵ "The United States Sets a Speed Record," *Marine Engineering and Shipping Review* Vol. 57, No. 7 (July 1952): 50-57.

brilliant if eccentric architect, who capitalized on the ship's status as a naval auxiliary; he alternately banned or classified photographs and erected plywood barriers covering the ship's lower hull whenever she was in dry dock.¹⁶ Whatever the journal's reason, it's obvious that American Export Lines intentionally pushed a concerted publicity campaign. Based on his long friendship with Dreyfuss and his position as company president, John Slater likely orchestrated this phenomenal amount of publicity for a professional who, while qualified, had little of the technical maritime background the *Review* usually covered. The publicity presented industrial design as a problem-solving tool for other design fields.

Dreyfuss's collaborative talent brought together his firm and the staff of Bethlehem Steel meet Slater's dictum to "watch out for maintenance" to provide a better working environment for the crew.¹⁷ Since his arrival at American Export Lines in 1935, Slater had been keeping close track of American maritime labor regulations. Working on the hotel staff of an ocean liner has always been famously demanding work, and still is. Before World War II, the hotel staff could expect to be on call twenty-four hours a day, and used the several days of turnaround in the vessel's home port to rest at home. Postwar labor standards introduced eight-hour shifts for hotel staff, the same rules that governed engineers and bridge personnel.¹⁸ Standards of crew accommodation also became stricter for American-flagged ships then they were

¹⁶ John Maxtone-Graham, *SS United States: Red, White & Blue Ribband, Forever* (New York: W.W. Norton & Company, 2014), 93.

¹⁷ Henry Dreyfuss, *Designing for People*, 180.

¹⁸ *Ibid.*, 180-81.

for foreign ones, although postwar standards began improving across the board.¹⁹ By 1946, the set standard for crew facilities was an average of thirty to forty square feet of space per person (for the lower ratings), and one shower and one toilet per eight crew members. Slater paid particular attention to the reconversion of the United States Lines' *S.S. America* back to passenger service. The company made the economically unpleasant discovery that bringing the crew accommodation in line with these new standards necessitated the elimination of berths for 151 passengers and about 7,000 cubic feet of cargo space—both losses of revenue potential.²⁰ As new vessels *Independence* and *Constitution* easily met crew accommodation standards, but the shift limits proved to be a thornier problem. To remain economically viable but still competitive in the passenger market, American Export Lines faced a choice: hire three times the number of hotel staff, reduce the standard of service, or change the work environment to eliminate unnecessary labor and reduce time spent on routine tasks. Dreyfuss's interest in labor saving processes proved invaluable for the revision of hotel and housekeeping procedures. Passengers, for instance, could easily operate the foldaway bunks developed for the Four Aces. After making up the cabin into "day mode" in the morning, the steward would fold away the bunk with the mattresses made up to be ready whenever the passenger opened them. Suddenly, a full compliment of stewards on the night shift, whose primary duty had been offering a turn-down service, became unnecessary.²¹ Throughout the design process, materials

¹⁹ James L. Bates and Ivan J. Wanless, "Aspects of Large Passenger Liner Design," *Transactions—The Society of Naval Architects and Marine Engineers*. Vol. 54, (1946): 351.

²⁰ *Ibid.*, 325.

²¹ Henry Dreyfuss, *Designing for People*, 180-81.

were tested and evaluated to help fulfill Slater's dictum. Dreyfuss personally selected surfaces and textiles throughout the ship for their durability and ease of maintenance. Prefabricated bathrooms and other "wet zones" offered an easily cleaned arrangement with no odd corners or inaccessible surfaces that defied an easy pass with a mop or dust cloth. Light fixtures and duct vents—famous collectors of dust—were easily accessible for repair and cleaning. Most importantly, all major ductwork, wiring, and plumbing was concentrated in one of fourteen vertical service trunks spaced at regular intervals throughout the superstructure.²²

These service trunks and the horizontal distribution zones were one of the biggest mechanical innovations on board the *Independence* and *Constitution*. It's unknown which party came up with the idea of organizing the all of the hotel services into easily accessible central locations. That the *Marine Engineering and Shipping Review* mentioned them in a list of Dreyfuss's other contributions to the vessels could indicate collaboration on his part with the engineers of the Bethlehem Steel Company's Shipbuilding Division. In 1949, two years before the debut of the two ships, E.P. Worthen, the chief engineer of Shipbuilding Division's Central Technical Department, and W.H. Muller, the hull design engineer, presented a paper entitled "Notes on the Design of Hotel Services for Passenger Ships" to the annual conference of The Society of Naval Architects and Marine Engineers.²³ As with many professional presentations of the era, the tone is neutral and impersonal: despite being associated with Bethlehem Steel there is no mention made of the Shipbuilding

²² "S.S. Independence: Interior Design," 80.

²³ E.P. Worthen and W.H. Muller, "Notes on the Design of Hotel Services for Passenger Ships," *Transactions—The Society of Naval Architects and Marine Engineers*. Vol. 57, (1949): 400.

Division's current efforts, although attendees at the conference knew Worthen and Muller's research would doubtless be employed with the two hulls taking shape in Quincy, Massachusetts.²⁴ Their investigations aimed to solve two problems: the adequate provision of power and water to provide amenities such as air conditioning, private baths, elevators, telephones, and other mechanical services; and their efficient distribution throughout the ship.²⁵ The best way to ensure this solution, they concluded, was collaboration between the engineering department and the designers of the passenger accommodation as early as possible in the process.²⁶ The reaction among their colleagues was, for engineers, enthusiastic. One in particular, Mr. Benjamin Fox, whose response was transcribed in the published proceedings, lapsed into homespun high praise:

This is an unusual paper. I wish we had more like it. Half of it is engineering analysis, because it deals with kilowatts and Btu's and flows. The other half, relating to zones and trunks, is engineering analysis that may not be recognized as such because it is plain horse sense... It is a fact that passenger ship generally have been built without adequate consideration of the factors set forth in this paper, with a consequent failure to achieve the full possibilities as to economy, reliability, simplicity, and ease of construction and maintenance.²⁷

Papers at the Society of Naval Architects and Marine Engineers conference rarely departed from the charts-and-statistics approach. Whether or not Henry Dreyfuss had anything to do with this specific paper, his ideological fingerprints and pragmatic

²⁴ Worthen and Muller, "Hotel Services for Passenger Ships," 434.

²⁵ Ibid., 400-401.

²⁶ Ibid., 401, 429.

²⁷ Ibid., 434.

approach to spatial problem-solving were easy to see. More importantly, as the head of the firm responsible for the ships' interiors and passenger amenities, his collaboration in these investigations into providing services was essential to their implementation on the *Independence* and *Constitution*. Whether directly or indirectly, he was invested and involved in Worthen and Muller's research and its practical implementation.

Service trunks on the earliest ocean liners provided natural light and ventilation to the engine compartments, whose massive piston-driven expansion engines often towered the equivalent of four or five stories. The enormous cowl ventilators that cluttered the decks of later ships essentially scooped fresh air down to the nether reaches of the lowest decks, particularly to interior cabins with no natural access to light and air. The *Independence* and *Constitution*'s air conditioning plants were not only new for large liners, they provided a complete exchange of air every few minutes, thanks to fan rooms at the top of all fourteen service trunks, discretely tucked away on the boat deck, that freed up clutter on the deck and within the service trunks themselves (see figure 18).²⁸

²⁸ Worthen and Muller, "Hotel Services for Passenger Ships," 428; American Export Lines, Inc., "Independence and Constitution," (New York: Promotional Brochure, 1953), 5.

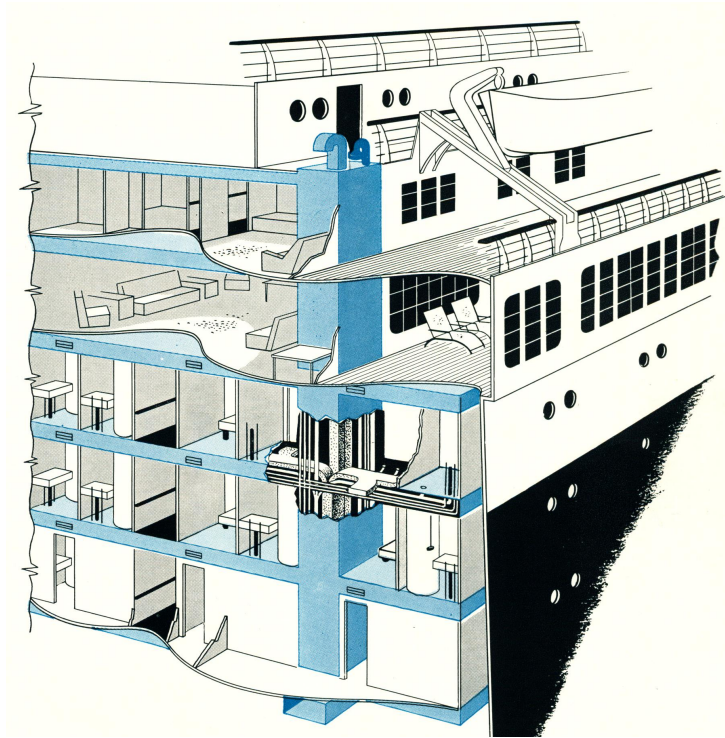


Figure 18: Illustration of the vertical and horizontal service trunks for the *Independence* and *Constitution*, as depicted in *S.S. Independence, S.S. Constitution: Bethlehem Built*, a shipyard publication commemorating the vessels' inaugurations into service. A sample plan of the horizontal distribution zones can be seen in Figure 17. Courtesy of the Hagley Museum, Garden, and Library.

These zones served three purposes. They primarily supported the interior decks. Built of structural-grade steel and strategically positioned with their inboard edges on the hull's girder line, the service trunks served as stanchions between decks, providing greater flexibility for the configuration of the remaining space.²⁹ Secondly, the concentration of service conduits in these designated locations also made repairs easier and much less disruptive to passengers.

²⁹ "S.S. Independence: Hull Construction," *Marine Engineering and Shipping Review* Vol. 56, No. 3 (March 1951): 73.

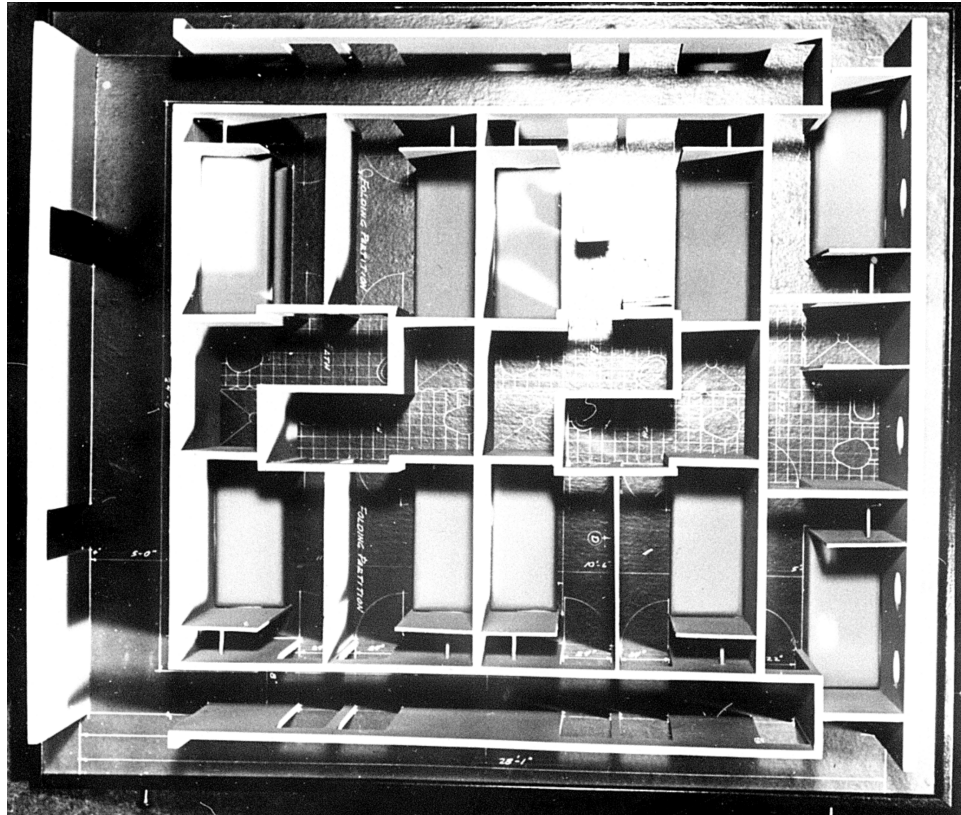


Figure 19: Henry Dreyfuss & Associates. View of cabin models. The bathrooms are arranged in a narrow row to permit the horizontal distribution from the inboard service trunks illustrated in Figure 16. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

Previously, when ductwork snaked randomly throughout the cavity between the ceiling panels and the deck head, repairs to a leaking pipe or faulty wiring frequently damaged staterooms, requiring passengers to move to an empty room if one was available.³⁰ Conduits to a stateroom were accessed from that stateroom. Any inconvenience caused by repairs would be confined to the affected space, rather than spreading into any adjoining cabins.³¹ Finally the horizontal (or transverse) branches

³⁰ Bethlehem Steel Corporation Shipbuilding Division, "Bethlehem Built," 27.

³¹ Worthen and Muller, "Hotel Services for Passenger Ships," 421.

of the ductwork were positioned above the bathrooms, whose lower ceilings hid the service channel.³² As much as possible, Dreyfuss clustered the passenger bathrooms on a line perpendicular to the length of the vessels to coincide with the service trunks (see figures 19 and 36). This had the fringe benefit of allowing higher ceilings in the staterooms and public rooms, and permitted a sleeker appearance due to a lack of access panels in the ceiling.³³

Although publicity for the *Independence* and *Constitution* discussed these largely hidden structural and service innovations, the ships' interior décor was the main selling point. Both vessels projected images of comfortable and unostentatious environments both inside and out. The exteriors blended modern touches in the streamlined curvature and tapering of the deckhouses with traditional forms, particularly the old-fashioned overhanging counter stern and the tall, slightly over scale pair of funnels.³⁴ Dreyfuss's interiors took similar cues, taking decorative inspiration from the name of the ships themselves.³⁵ The patriotic overtones of the ships were continued in naming practices for the public rooms and suites. The ten most deluxe first-class staterooms on the *Independence*, for instance, were named after

³² Bethlehem Steel Corporation Shipbuilding Division, *Bethlehem Built*, 27.

³³ "S.S. Independence: Hull Construction," 73.

³⁴ "The Independence: Principal Dimensions and Data," 60.

³⁵ Named after early American naval vessels, the *Independence* and *Constitution* were a departure from American Export Lines naming practices. Typically, AEL ships possessed names beginning with *Ex-*, a reference to "Export" which occasionally produced some whacky results such as *Excambion* or *Exochorda* when they ran out of more obvious choices. Eventually, the company adopted the practice of using *Export* as a separate suffix (i.e. *Export Challenger*). Distinctive related names have a long history with merchant marine companies. For example, Cunard famously ran through the entire list of Roman provinces ending with *-ia*, and White Star produced a large fleet of floating adjectives ending in *-ic*.

signers of the Declaration of Independence, while on the *Constitution* they honored famous captains of the original naval frigate *Constitution* of 1797.³⁶ Advertisements described Dreyfuss's interior work on the ships as "a careful mixture of the American Modern and Colonial themes."³⁷ To current eyes, little about these spaces, with their bright colors and sleek furniture, seems "Colonial" at all. A more accurate description would be another of the catchphrases developed by AEL: "Modern American Living at Sea." Though working within the contemporary vernacular, Dreyfuss studiously avoided the extremes of modernism, as he always had, and sought to make the spaces intimate and individualized, but flexible and adaptable for multiple uses. His designs were a form of compromise based on his research.

Flexibility permeated the passenger quarters in all classes. The strict three-class divisions of most twentieth century ocean liners had begun to fade during the 1950s, and Dreyfuss's layout helped the *Independence* and *Constitution* adapt to these changing attitudes. Though the ship's passenger complement remained at just over a thousand berths, these could shift depending on demand for certain categories of staterooms. A substantial 43% of the ship's capacity (431 berths) was designated as "convertible." These staterooms could fluctuate between Tourist and Cabin classes, and between Cabin and First Class, as needed (see figure 20).³⁸

³⁶ American Export Lines, Inc., "Independence, Constitution: Deck Plan," (New York: Promotional Brochure, 1953).

³⁷ Bethlehem Steel Corporation Shipbuilding Division, *Bethlehem Built*, 15.

³⁸ "S.S. Independence: Hull Construction," 66.

1003 Total Capacity

Base First Class	Convertible First and Cabin Class	Base Cabin Class	Convertible Cabin and Tourist	Base Tourist	
205	160 + 134 upper berths	109	137	258	
365 First	*	246 Cabin	258 Tourist		Max First Class
205 First	540 Cabin		258 Tourist		Max Cabin Class
205 First	403 Cabin		415 Tourist		Max Tourist Class

* upper berths not used

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Figure 20: Chart illustrating the various possibilities for the class configuration of the *Independence* and *Constitution*, showing the base numbers and maximum capacity for each class. Drawing by the author.

This allowed the ships to accommodate seasonal fluctuations in passenger numbers—such as higher numbers of budget tourists and students in the summer months.

Convertible staterooms such as these posed certain design challenges for Dreyfuss. On one hand, they couldn't be “too basic” for the more expensive and lower-occupancy tickets when required, but neither could they be too nice for the less expensive tickets, although sometimes this was unavoidable. For example, the convertible staterooms between Tourist and Cabin class all possessed private bathrooms, a standard feature of Cabin class that doubtless commanded a slightly higher price for Tourist passengers. Likewise, the convertible staterooms between First and Cabin class differed only in the number of occupants in the stateroom: hidden upper berths allowed for a one or two more Cabin passengers in a space normally shared by two First Class passengers occupying the lower bunks. Rather than overt differentiation, all passenger accommodations were designed to a similarly high standard of comfort. Aside from the communal bath facilities in Tourist, the most appreciable difference was stationary bunks for the most basic Tourist staterooms, rather than the convertible sofas and

foldaway berths in Cabin and First Class.³⁹ The main difference was between the classes were the number, size and location of the public rooms, and the services provided by the hotel services staff free of charge. To accommodate fluctuating passenger distribution between classes, certain public rooms could be converted between classes as needed. The “Oak Room,” a secondary Cabin Class social hall on the Main Deck, could be converted to a Tourist Class lounge by closing the folding doors to the Cabin Class entrance forward of the room, and opening a short passage to the Tourist Class entrance just aft. Similarly the “Commodore’s Terrace,” the after end of the First Class cocktail bar, could be screened off by folding panels and opened to Cabin Class, who accessed the room from their port-side staircase. Portable chain rails delineated outdoor deck space between the classes, based on that voyage’s demographics.⁴⁰ Of course, any demarcation was more psychological than physical. Trespassing between classes in both directions has long been part of shipboard life, albeit officially frowned upon by the crew and difficult for adults. Well-dressed and behaved children and adolescents, on the other hand, often roamed ocean liners at will, using rooms shared by multiple classes, notably playrooms, theaters, chapels (on ships that possessed one), and even crew corridors to access other realms of the ship.⁴¹

³⁹ “S.S. Independence: Interior Design,” 87.

⁴⁰ “S.S. Independence: Hull Construction,” 68.

⁴¹ Maxtone-Graham, *SS United States*, 185.

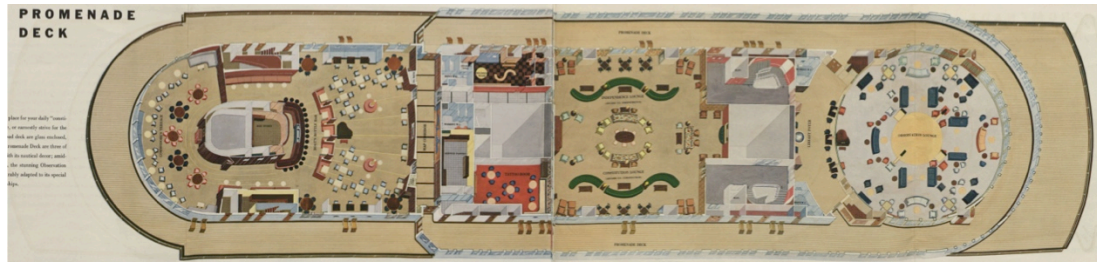


Figure 21: American Export Lines, Inc. Deck plan of the promenade deck of the *Independence* and *Constitution*. “Independence, Constitution: Deck Plan.” Maritime Ephemera Collection of Christian Roden.

On the *Independence* and *Constitution*, the Promenade Deck serves as the best example of the development of Dreyfuss’s approach to shipboard public rooms. It was also here that he incorporated elements of “Colonial” décor paying homage to the patriotic overtones of the ships’ names and their self-conscious “American-ness” that served as advertising copy for the first part of their careers. Encompassing the entire length of the superstructure, the Promenade Deck was entirely reserved for First Class passengers, unless the “Commodore’s Terrace” was needed for overflow Cabin Class occupancy. The public rooms were much larger than the ones he designed for the Four Aces to accommodate the greater number of passengers. Aside from the size, Dreyfuss also employed a bolder color palette. Whereas he had preferred neutrals and navy blue for Four Aces, his new interiors featured large expanses of bright, highly saturated colors such as flag red, Kelly green, and sky blue in draperies or accent walls. Primary surfaces such as carpets and paneling tended to be gray, beige, or natural wood tones that helped balance the colors. While each room was a separate entity, Dreyfuss carried over colors, motifs, and materials from one room to the next to create continuity between spaces.⁴²

⁴² “S.S. Independence: Interior Design,” 81.

The progression of spaces on the Promenade deck, from fore to aft, gradually decreased in modernity and formality (see figures 35, 40, 41, and 42). The “Observation Lounge,” for instance, doubled as the ship’s ballroom by night, when the custom-made curtains woven by Dorothy Liebes closed off the large windows circling 270 degrees of the room’s circular perimeter. This room was also the most neutral, with gray carpeting, walls and sofas. Only a few accents of flag red in easy chairs played into the proceeding spaces. The ship’s crescent-shaped library next door kept the gray carpeting and upholstery, but introduced fireproofed wood veneers on accent walls, which was repeated in the main lounge next door.⁴³ The main lounges were named after their respective ships, and were the most overtly historic. At the forward end of each room, a small alcove painted flag red emphasized a framed replica copy of the founding document associated with each ship’s name, the Declaration of Independence on the *Independence* and the Constitution of the United States on the *Constitution*. Against the aft wall, a reproduction pine breakfront housed a display of American decorative arts on loan from the Metropolitan Museum of Art in New York City, a rotating display of silver, pewter, glassware, and ceramics. The sofas and curtains were upholstered in printed linen with a pattern of abstracted birds, allegedly inspired by Audubon prints (see figures 34 and 35).⁴⁴ The after promenade deck spaces, the ship’s private dining room named the “Tattoo Room” and the cocktail or “Boat’n Bottle Bar” played up the bright colors and whimsy. Murals of early

⁴³ An interesting feature of the ships’ libraries were the massive globes, copies of the ones manufactured by Henry Dreyfuss & Associates during the war for personal use by Franklin Delano Roosevelt, Winston Churchill, and Josef Stalin.

⁴⁴ “S.S. Independence: Interior Design,” 82.

American sailor tattoo designs and wall displays of ships in bottles, though brash and somewhat kitschy, paid homage to the ships' "American-ness" that the company sought to adopt as its brand identity.

The *Independence* and *Constitution* were Dreyfuss's biggest projects in terms of size, materials, and man-hours, but they could not have happened without his skills at communicating verbally and visually, and his excellent working relationship with John Slater. The flexible passenger capacity of the two ships fulfilled the immediate market needs, and accommodated shifts in numbers and demographics as jets became more of a presence on the international travel market. Likewise, the incorporation of industrial design principles into the ships eased demands on the crew, allowing for more efficient work from fewer people to help keep the line solvent. All these solutions were reached through open discussion, using words and visual strategies through model making to arrive at the best result. The role of industrial design in the planning and construction process received more attention than it ever had before, with the result that Dreyfuss's work was broadcast to industry professionals around the country. Though they heralded a closer relationship between industrial design and engineering, the launch of the *Independence* and *Constitution* also signaled the end of an era. Within a decade, jet-powered airliners claimed the lion's share of passenger traffic, leaving shipping lines with little alternative but to turn to the more democratic cruise market, where anything labeled by class was out of the question. Despite these changes in commercial function, the *Independence* and *Constitution* continued to be popular and easy to run ships, enjoying extraordinarily long careers of fifty-seven and forty-four years, respectively. Dreyfuss's innovations, and particularly his research methods, resonated with transportation executives around the world. Institutions from

new cruise lines to the United States military sought advice from industrial designers, including Dreyfuss, for help in their latest projects. The methods by which people traveled may have changed, but their ergonomic considerations had not. Dreyfuss's insights into the relationship between the human body and mind to the immediate environment did just as much to modernize the twentieth century as new technology and streamlined styling.

CONCLUSION

THE MAN WHO LISTENED

Henry Dreyfuss's success cannot be catalogued by listing his clients or accomplishments. Good products may speak for themselves, but so do the intangible aspects of any relationship, business or personal. Clients from the American Export Lines to the Bell Telephone Company to John Deere retained the services of Henry Dreyfuss & Associates for decades, relying on them to bring several generations of new products to fruition.¹ Chief among Dreyfuss's talents was his knack of listening to people, and understanding their underlying concerns. His was a subtle power of persuasion. He believed in the importance of people, their likes and dislikes, strengths and foibles. He empathized with their struggles; instead of imposing design on them, he appealed to their desire to be efficient, safer, or just plain happier in their day-to-day lives.

Although ships, trains, and airplanes all possess finite lifespans due to their constant hard use in extreme environments, four of Dreyfuss's six American Export Lines ships not only outlived their designer and the American Export Lines, but three of them enjoyed careers of around fifty years—an extraordinary age that few ships manage to achieve.² Thanks to their innovative design and ease of maintenance and

¹ Henry Dreyfuss Curriculum Vitae "Brown book," Henry Dreyfuss Archive, Cooper-Hewitt National Design Library.

² John Slater retired in 1957, seven years before American Export Lines merged with the Isbrandtsen Steamship Company. The entire enterprise succumbed to bankruptcy in 1977. (René De La Pedraja, *A*

repair achieved through collaboration with the engineers of the Bethlehem Steel Shipbuilding Division, these ships proved valuable to subsequent owners. Dreyfuss's ideas and innovations to the process of design became his chief legacy. In 1950, the United States Navy hired Dreyfuss and his firm to spearhead efforts to improve the habitability of their 2,200 ton "Gearing" class destroyers, a project which provided a considerable amount of satisfaction to the Navy and the vessels' crews. Even when ocean liners ceased to be a profitable method of international transportation, the cruise industry adopted Dreyfuss' design methodology. In 1981, more than thirty-five years after Henry Dreyfuss & Associated built mock cabins in an old New York stable, author John Maxtone-Graham was ushered through the Aalborg shipyards in Denmark, where the MS *Tropicale*, the first of a new generation of purpose-built cruise ships that have reshaped the industry was nearing completion. In a side warehouse, he opened a door to find himself in a complete cabin, "dressed" with passenger belongings. Shipyard officials explained the importance of mock cabins like these in terms of industry research for attracting new passengers to cruising.³ The purpose of the project and its justification was almost exactly what Dreyfuss had used three decades earlier.

Henry Dreyfuss's ability to collaborate complemented his problem-solving skills. His relationship with John Slater, and hence the American Export Lines, serves as a case in point. In the nineteen years their professional connection lasted, they played to each other's strengths, gracefully deferring to the other's expertise. Dreyfuss

Historical Dictionary of the U.S. Merchant Marine and Shipping Industry Since the Introduction of Steam (Westport, CT: Greenwood Press, 1994), 575).

³ John Maxtone-Graham, *Liners to the Sun* (Dobbs Ferry, NY: Sheridan House, Inc., 2000), 243.

listened to Slater's observations about the changing methods of long-distance travel and the increasing number of labor regulations, and tailored his design work to help meet flexible passenger requirements and encourage more efficient labor. Slater, for his part, gave Dreyfuss sufficient time to research and troubleshoot his designs for the *Four Aces*, and facilitated his participation in the design and construction process for the *Independence* and *Constitution* at a level never before achieved by professionals outside the marine engineering field. Their mutual respect evidently spilled over to the engineers and joiners at Bethlehem Steel's Shipbuilding Division. When the twin liners were inaugurated in 1951, Henry Dreyfuss was acknowledged by name on the builder's plates. The credit as designer of the interiors may not have described all the nuances of his firm's role, but on this, the shipyard's public seal of approval of their work, this sort of acknowledgement was new and unprecedented.



Figure 22: Builder's plate, SS *Independence*. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

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Appendix A
ADDITIONAL FIGURES

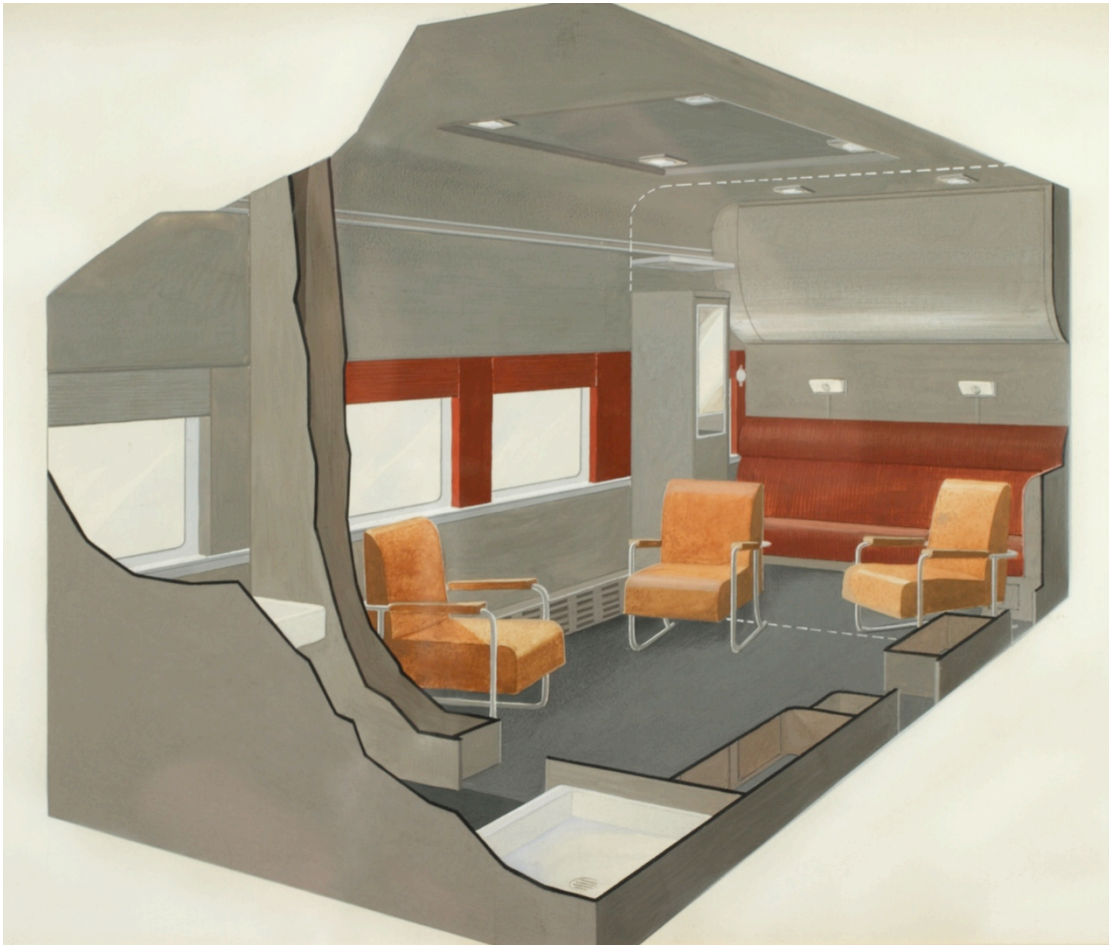


Figure 23: Twentieth-Century Limited Interior: Deluxe Suite. Henry Dreyfuss (1904-1972), 1938. Gouache on paper, H 12" x W 17", framed, H 15 ³/₄" x W 19 ¹/₄". Collection of the Albany Institute of History & Art, gift of the New York Central Railroad, 1959.130.3



Figure 24: *(above)* American Export Lines, Inc. Illustration of the Passenger Lounge on the 1948 Four Aces. "The 4 Aces: Excalibur, Exochorda, Exeter, Excambion." Maritime Ephemera Collection of Christian Roden.



Figure 25: *(left)* American Export Lines, Inc. View of Dining Saloon on the 1931 Four Aces. "Yankee Cruises De Luxe to the Mediterranean." Maritime Ephemera Collection of Christian Roden.



Figure 26: Four Aces, stateroom bunks in upright position. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.



Figure 27: Four Aces, stateroom bunks in down position. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

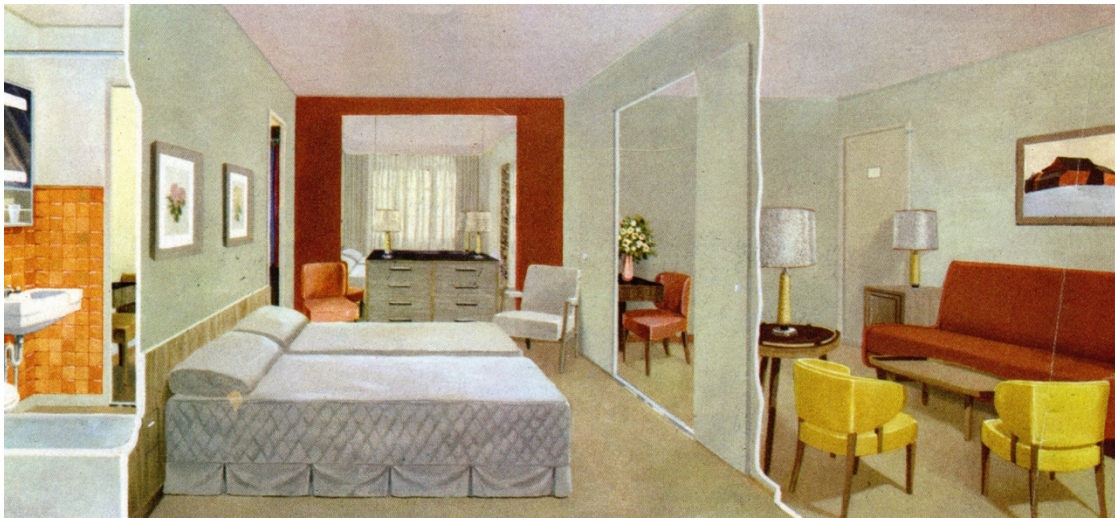


Figure 28: American Export Lines, Inc. Illustration of the de luxe suite of the Four Aces. "The 4 Aces: Excalibur, Exochorda, Exeter, Excambion." Maritime Ephemera Collection of Christian Roden.



Figure 29: (left) American Export Lines, Inc. Page from the 1946 Annual Report, showing photographs of stateroom mockups built by Henry Dreyfuss & Associates as part of the Four Aces Project. Courtesy of The Mariner's Museum Library.

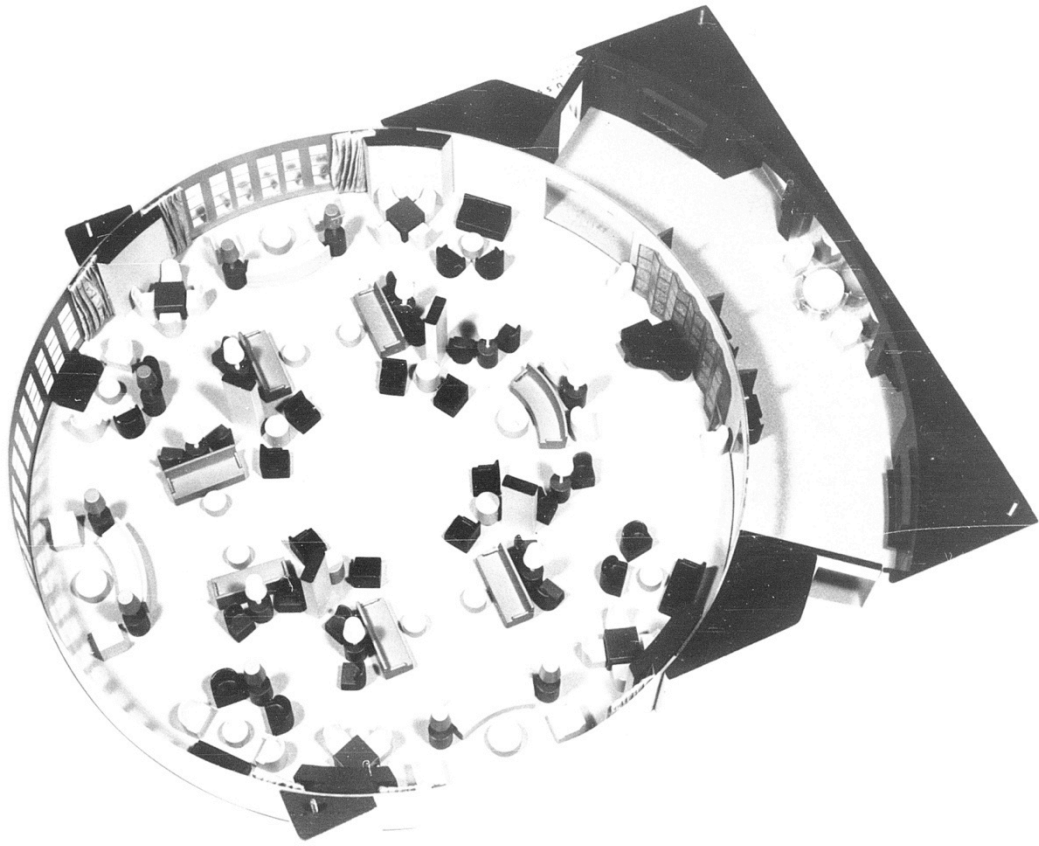


Figure 30: Henry Dreyfuss & Associates. Model for First Class Observation Lounge of the *Independence* and *Constitution*. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.



Figure 31: Henry Dreyfuss & Associates. Model for stair tower for the *Independence* and *Constitution*. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

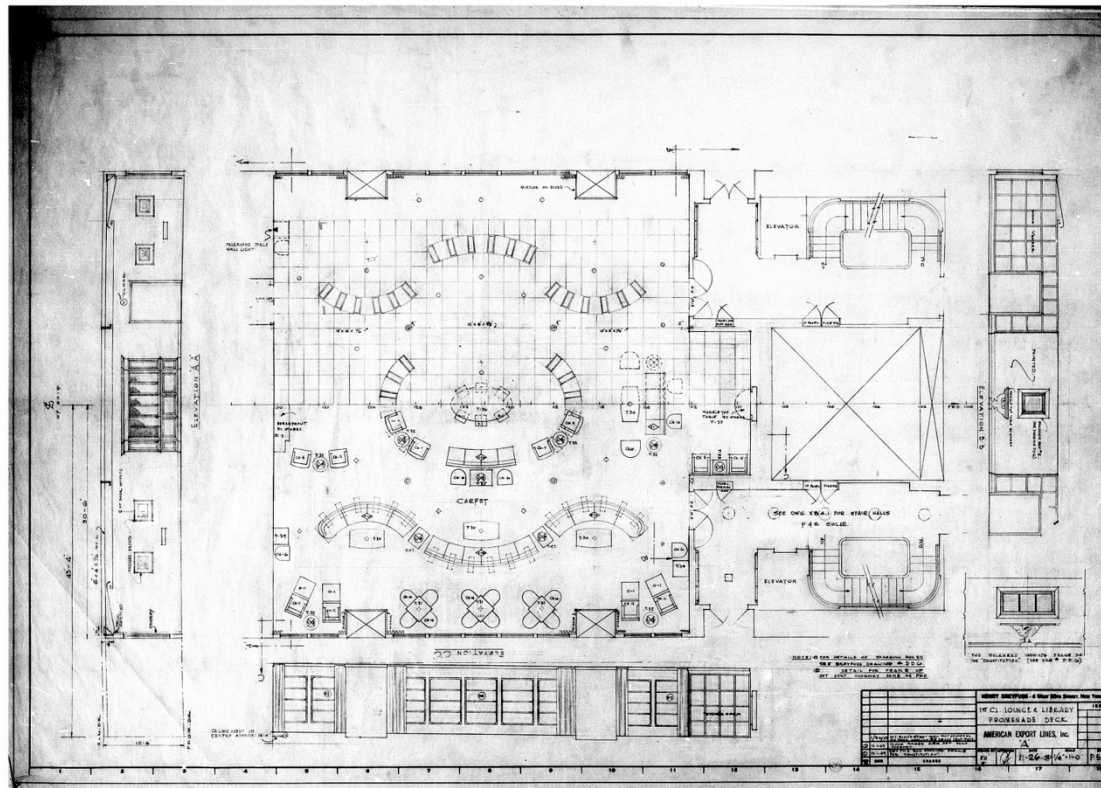


Figure 32: Henry Dreyfuss & Associates. Plans for First Class Lounge and Library of the *Independence* and *Constitution*. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.

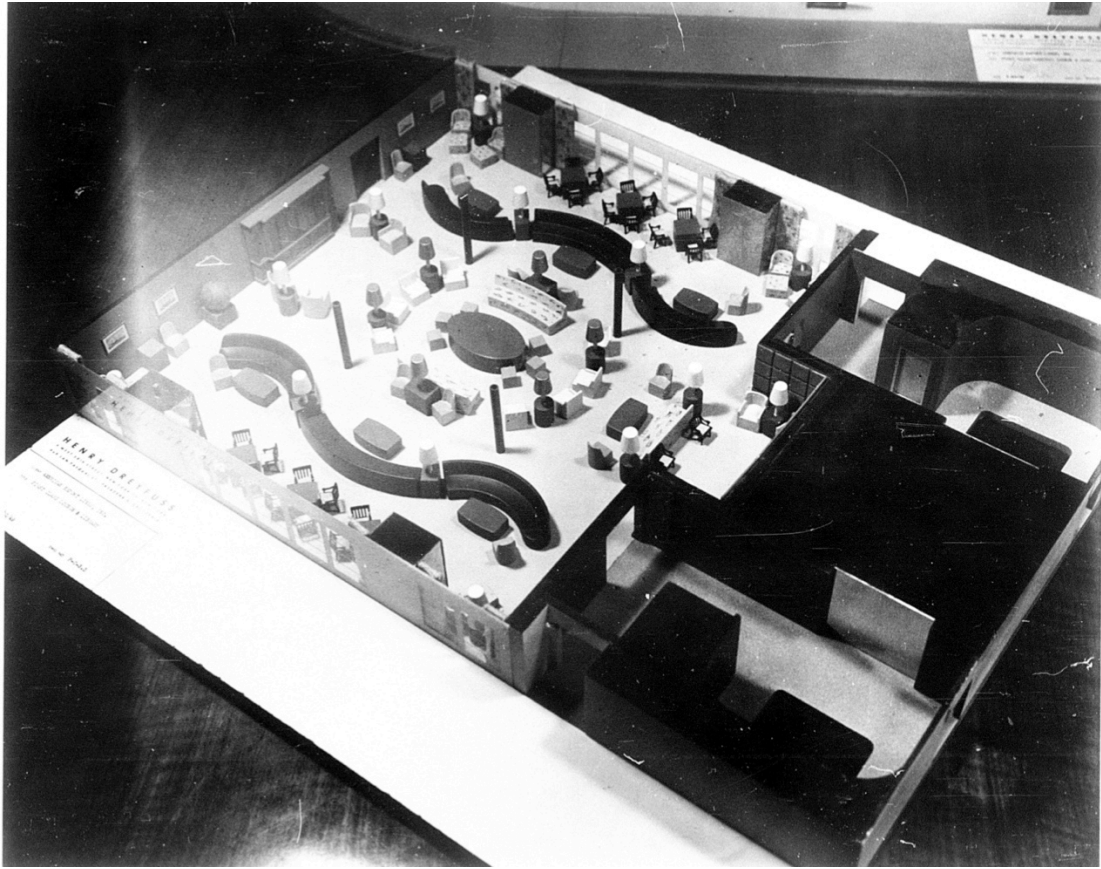


Figure 33: Henry Dreyfuss & Associates. Model for First Class Lounge and Library of the *Independence* and *Constitution*. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.



Figure 34: Henry Dreyfuss & Associates. Photograph of decorative arts display case in the First Class Lounge and Library of the *Independence* and *Constitution*. Henry Dreyfuss Archive; Cooper Hewitt, Smithsonian Design Museum; Gift of Henry Dreyfuss, 1972-88-1.



Figure 35: First Class Lounge and Library for *Independence and Constitution*, Courtesy of the Hagley Museum, Garden, and Library.

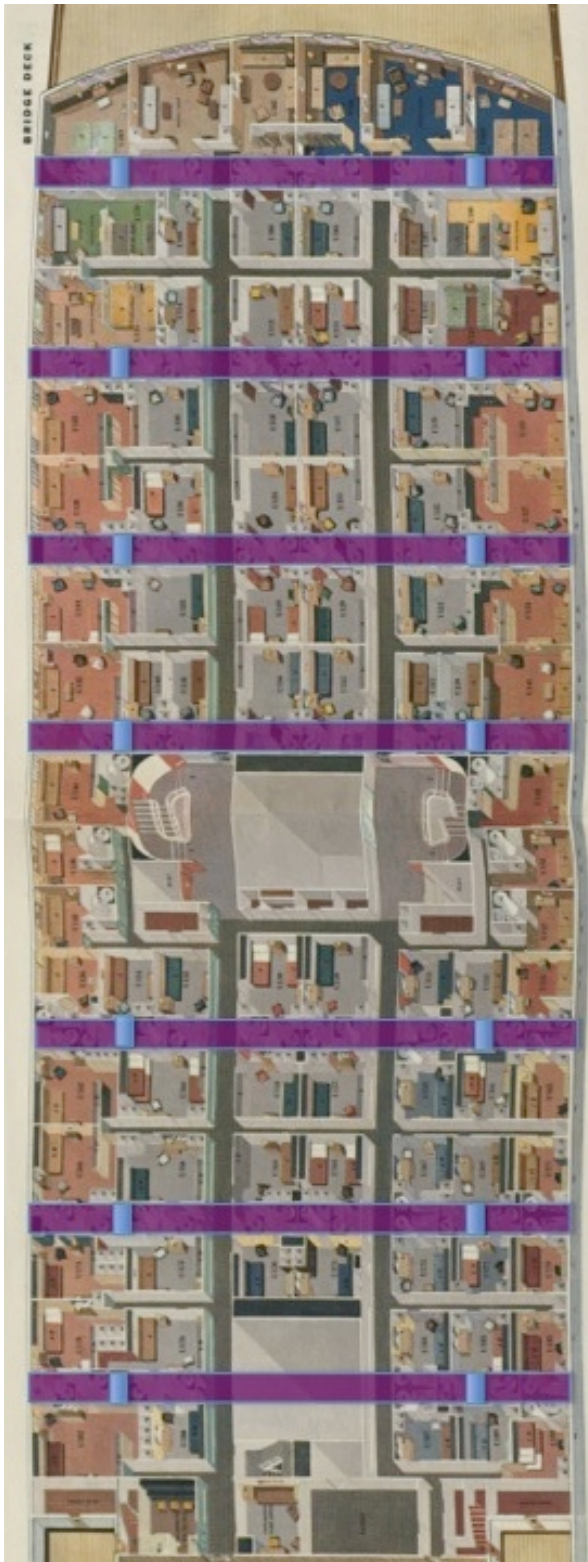


Figure 36: American Export Lines, Inc. Plan of the forward end of the Bridge Deck of the *Independence* and *Constitution*. Vertical service trunks are highlighted in blue, while the horizontal distribution zones are highlighted in purple.
 “Independence, Constitution: Deck Plan.” Maritime Ephemera Collection of Christian Roden.



Figure 37: First Class stateroom for *Independence* and *Constitution*, Courtesy of the Hagley Museum, Garden, and Library.



Figure 38: (above, left) Cabin Class stateroom for *Independence* and *Constitution*, Courtesy of the Hagley Museum, Garden, and Library.

Figure 39: (above, right) Tourist Class stateroom for *Independence* and *Constitution*, Courtesy of the Hagley Museum, Garden, and Library.



Figure 40: First Class Observation Lounge for *Independence* and *Constitution*, Courtesy of the Hagley Museum, Garden, and Library.



Figure 41: First Class Library Foyer for *Independence* and *Constitution*, Courtesy of the Hagley Museum, Garden, and Library.



Figure 42: First Class “Boat ‘n Bottle Bar” for *Independence* and *Constitution*, Courtesy of the Hagley Museum, Garden, and Library.

Appendix B

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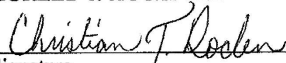
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