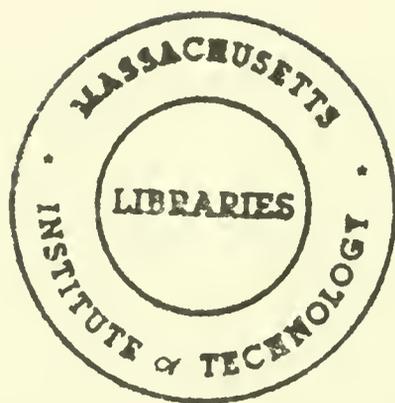


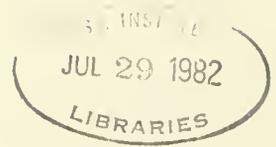
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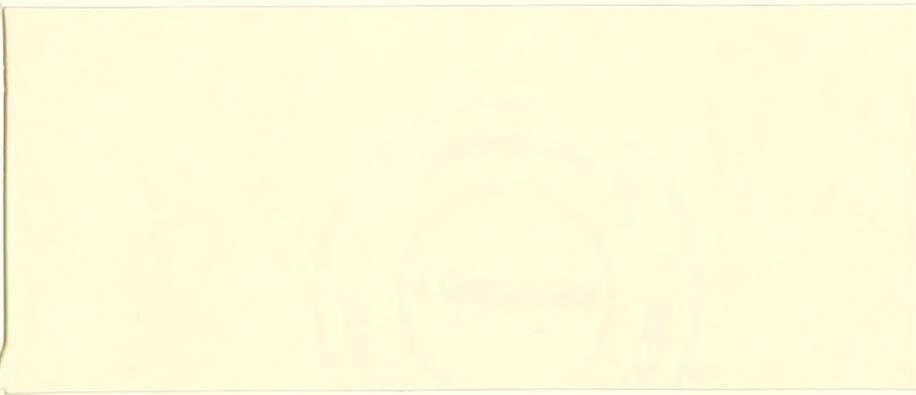
by

Mel Horwitch*

WP1306-82

May, 1982

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The Role of the Concorde Threat in the U.S. SST Program

by

Mel Horwitch

I. The Need For a Shield

The managerial success of government demonstration programs for developing large-scale technologies depends on a host of factors, including an effective champion like James Webb of NASA, Hyman Rickover of the U.S. Navy, and Robert Moses in New York City, a worthwhile technology, skill in bureaucratic politics, and support from potential users in the private or public sectors. Another essential ingredient for managerial success is the existence of a shield that protects a program from possible protests emanating from various sectors of society. Often national defense clearly has provided such a protective cloak. It effectively helped buffer the Manhattan Project during World War II and various weapon systems programs during the 1950s and early 1960s from interference and damaging criticism. National prestige or an absolute presidential commitment can play a similar role. The Apollo program benefited from this form of shield. On the other hand, as large-scale demonstration projects moved from defense or aerospace toward

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commercialization goals in the 1960s and 1970s in such areas as nuclear energy, mass transit, and synthetic fuels, protective shields that had previously functioned so effectively began to disappear, and with this dissolution the likelihood of managerial success began to diminish considerably.¹

The ultimately unsuccessful American SST program signalled both the disappearance of effective protective shields and the related change of objectives toward commercialization for large-scale projects. For perhaps the first time arguments based on national prestige and international rivalry were not sufficiently powerful to save a government demonstration program.

This article focuses on perhaps the major component of the SST's unsuccessful protective shield: shifting and confused U.S. perceptions of the threat posed by the Anglo-French Concorde program to the overwhelming American hegemony in international civil aircraft manufacturing.

During the rocky life of the American SST program, from its formal beginning on June 5, 1963 when President John F. Kennedy announced the program at the Air Force Academy to its final defeat in March 1971 when both the House and Senate voted against further funding, the effort encountered a rich array of obstacles: technical difficulties, uncertain or questionable economics, bureaucratic conflict, fragmentation of programmatic control, growing sonic boom, noise, and ozone-layer concerns, doubts over program management capability, and general skepticism at the very highest levels of government and parts of industry.² Given the great diversity making up this portfolio of vulnerabilities, it is all the more remarkable that the program survived the decade of the 1960s. Any one of these factors might well have killed the program. Yet when all other pro-SST arguments failed, supporters could always point to the foreign threat to American dominance of commercial aviation. Across the Atlantic with their Concorde program the British and French

appeared to be making a determined effort to wrest from the United States its post-World War II leadership of the civil aviation industry.* A natural concern for American officials, even for those skeptical about the SST, was whether the United States could afford ignoring this challenge. The power of international rivalry was a crucial factor in allowing the SST program to continue in the middle and late 1960s and in maintaining a program that might otherwise have collapsed long before 1971.

American perception of foreign SST programs was ambivalent and complex during the 1960s, reflecting a faith in American aviation technology that was at times informed and at times chauvinistic and a latent fear of and grudging respect for European SST efforts. The stance of U.S. participants with respect to the American SST program also affected American views of the foreign threat. Extreme SST opponents disparaged all SST efforts as wasteful, harmful, and futile. SST supporters emphasized the soundness and potential success of the Concorde; but SST proponents were also careful to stress that American aviation technology was fundamentally superior to that of state-controlled European industry so that the European program was portrayed as a serious competitor only if the United States failed to act.

*The Soviet Union, with its TU-144 SST program, also seemed eager for part of the spoils. But unlike the Concorde, the TU-144, although an object at times of Cold-War rhetoric and actually the first SST to fly (on December 31, 1968), was never seriously considered by any major U.S. official a threat to American aviation interests. Therefore, this article focuses solely on American perceptions of the Concorde.

II. The Concorde as a Force in Establishing the American SST Program

The Anglo-French Concorde program was announced in November 1962 and almost immediately became a key factor in accelerating the momentum for a U.S. SST effort. The Concorde came as no surprise to American SST enthusiasts in the Federal Aviation Agency (FAA)*, which had been sponsoring SST research and feasibility studies since 1960. Ever since FAA administrator Najeeb Halaby had assumed office in early 1961 and immediately began lobbying for an American SST development project. He also consistently rejected numerous European, especially British, overtures for a joint SST program and never had any intention of becoming partners with the British or the French. As he candidly testified on Capital Hill in April 1961, "We want to be there [in the SST race] ahead of our competitors."³ This aloof American posture helped drive the British and French into each other's arms.

The formal creation of the Concorde program provided Halaby with a formidable promotional weapon. By November 1962 the danger posed by the new Anglo-French project was his main lobbying theme. In a report to President Kennedy Halaby portrayed a successful Concorde as forcing the United States to "relinquish world civil transport leadership"; costing over 50,000 U.S. jobs; and potentially leading to U.S. dependence on foreign suppliers for supersonic military aircraft. Halaby clinched his appeal by warning that "conceivably" an American president would someday fly in a foreign aircraft.⁴

The Concorde announcement was a crucial factor in mobilizing support within the administration for an American SST program. As Halaby recalled years later, "When de Gualle embraced the joint [Anglo-French] Concorde project, it seemed to trigger competitiveness in John Fitzgerald Kennedy. In

*The FAA became the Federal Aviation Administration in 1967 when it lost its independent-agency status and became part of the new Department of Transportation.

fact, I think JFK associated the Concorde most with de Gualle; on more than one occasion, he said, 'We'll beat that bastard de Gualle...' Every time I saw the President, from the day de Gaulle made his announcement, he would press me on how our [SST] studies were going---and how the British and French were doing."⁵

In an even more direct way the Concorde was a major factor forcing the president to announce an American SST program on June 5, 1963. During the spring of 1963 Pan American Airlines---the "flagship" of American air carriers, flying practically all international routes, including the crucial transatlantic run, and traditionally leading the way in ordering new aircraft---made sure that the FAA and the White House knew that although the airline was considering ordering a number of Concorde, it really wanted to purchase a fleet of larger and faster American Mach* 3 SSTs. Juan Trippe, president of Pan American, informed a number of high-level U.S. officials, including Halaby, Civil Aeronautics Board Chairman Alan Boyd, and Secretary of the Treasury C. Douglas Dillion, and that he intended to place a "protective order" for six Concorde.

Trippe's actions had their desired effect. Vice-President Lyndon B. Johnson, who was chairing a cabinet-level SST review committee at that time and who had already recommended an SST go-ahead to President Kennedy, became extremely worried over the impact of the Pan American Concorde decision. Armed with Johnson's recommendation and the knowledge of Trippe's move to order Concorde, Kennedy quickly decided to establish an SST program. But to Kennedy's great anger and Halaby's shock, Pan American announced its order for six Concorde on June 4, 1963, one day before Kennedy's SST declaration.⁶ Still with the Concorde's help Halaby finally had his program.

*Mach, named for the Austrian physicist Ernst Mach, refers to the speed of a body, measured in relation to the speed of sound that is itself equal to Mach 1.0---about 760 mph at sea level.

III. American Skepticism Toward the Concorde

Halaby in the early summer of 1963 was at the peak of his power. He had achieved his long-sought goal: an SST program under FAA direction. However, he soon suffered a dramatic decline in authority from which he would never recover. His fall was partially due to the change in administrations that occurred as a result of the assassination of John F. Kennedy on November 22, 1963. Halaby, a Kennedy appointee, was never close to Lyndon Johnson and did not particularly get along with him. Although a consistent SST supporter, Johnson also wanted to put his own stamp on what had been a Kennedy program.⁷

Just as important in promoting a power shift were swelling complaints from the manufacturers. They objected especially to President Kennedy's original cost-sharing requirements (75 percent of the costs would be borne by the government and 25 percent by the manufacturers). Responding to these complaints, Kennedy in August 1963 asked Eugene Black, former head of the World Bank, to review the SST financing issue. Black brought in a fellow industrialist and financier, Stanley de J. Osborne, and together they examined the SST financing question. Their report was submitted to President Johnson in December 1963 and quickened Halaby's decline. Black and Osborne sided with industry in deciding that the 75-25 cost-sharing ratio was overly burdensome and recommended instead that 90 percent of the development cost be assumed by the government and 10 percent by the manufacturers. Black and Osborne then went beyond their charter and offered proposals that were exactly the opposite of what Halaby's advocated. They recommended that the SST program be taken out of the FAA and be made an independent "Authority", reflecting a growing opinion by informed persons in the government and industry that the FAA lacked the managerial skills and experience to run a complex effort like the SST program. They also saw no necessity for a crash program, noting that the British and French were already encountering major problems of their own.⁸

The Black-Osborne report triggered a series of internal administration reviews of the whole SST effort in early 1964 that finally led to the formation of the President's Advisory Committee on Supersonic Transport (PAC) in April 1964. The PAC was chaired by probably the most powerful and influential official in the government at that time, next to the president, Secretary of Defense Robert S. McNamara, and was made up of cabinet-level officials, including the secretaries of treasury and commerce, the CIA director, the administrators of NASA and the FAA, and Black and Osborne.⁹ A massive power shift had taken place. McNamara was now the most important decision maker in the SST program and major policy decisions were now made in the PAC rather than the FAA.

The initial concern caused by the Concorde had faded by 1964 and the Concorde program was not the center of American SST policy-making attention. As in the past almost all significant American-European SST exchanges were limited to purely technical SST information.¹⁰ In fact, the Concorde seemed to be in deep political and technical trouble. In late 1964 the newly elected Labour government called for a thorough review of British participation in the program. The CIA reported in October that the Labour Party's stance would have serious repercussions for the Concorde, and McNamara was even warned in November 1964 that Great Britain might withdraw completely. However, McNamara's key SST aide, Joseph Califano, believed that the British would probably continue to participate, though the British reappraisal had clearly weakened the Concorde. "Whatever the outcome," Califano told McNamara, "the introduction of so much strain and uncertainty into the Concorde program because of the political factors makes it doubtful whether the degree of cooperation that has thus prevailed between the British and French can be maintained." Design revisions had also set the Concorde program back as much as two years and development costs were spiraling (estimated at \$400 million

for the British share in November 1964). A NASA analysis of the Concorde "optimistically" estimated that Concorde direct operating costs would be 1.4¢ per seat-mile (compared with 1.0¢ to 1.1¢ per seat-mile for the subsonic Boeing 707). Califano indicated that the Concorde's performance would probably further deteriorate.¹¹ At the end of 1964 only the strongest SST proponents, including Halaby and potential SST contractors like Lockheed,¹² even bothered stressing the danger of Concorde success.

Both SST proponents and skeptics in the United States also continued their long-standing aversion to joint SST development with the Europeans. In 1965 the Americans squashed a new feeler by the British and French for cooperation and, according to the French, for "dividing the world [SST] market" between the United States and the Europeans.¹³ The generally disdainful American view of the Concorde effort was expressed at the March 30, 1965 PAC meeting. CIA director John McCone, in presenting the current intelligence on the Concorde (carefully noting that the CIA had not used "clandestine sources" because of the "risk of offending one of the host countries"), minimized Concorde accomplishments. He reported that little European work seemed to have been done on the sonic boom problem and that extensive design modifications and economic uncertainties would surely cause further delays. He reminded the PAC members that as one moved gradually upward from the Mach-1.5 to the Mach-2 range unexpected technical problems were bound to arise, and these would take time to correct. He was not at all worried about the Concorde's alleged two-to-three-year lead, and suggested at any rate that Anglo-French forecasts be taken "with a grain of salt...quite a large one." Halaby, of course, disagreed. He noted that the Concorde had won significant airline commitment (in addition to BOAC and Air France, a total of forty-eight delivery positions had been reserved by other airlines), that the Concorde managers "think they will muddle through," and that in any case the

Concorde was not "another Comet," referring to the ill-fated British commercial jet introduced in the 1950s. But McNamara strongly backed McCone, calling McCone's review "a very interesting report, the best we have had so far." McNamara argued that the American SST should be a profitable commercial venture and that the pace of Concorde work should not "dictate" American SST development. He felt that the United States would ultimately build a better SST; there was therefore no need to worry about the Concorde's lead.¹⁴

McNamara was also receiving economic evaluations that supported his skepticism about the Concorde from an SST economics task force that McNamara had recently established in the Pentagon in early 1965. This group was headed by Stephen Enke, a respected economist. The estimates of the task force gave the Concorde only a minor market niche, and Enke was convinced that the Concorde would have a hard time keeping up with the American competition. Anglo-French dates for commercial Concorde operation were termed "patently unrealistic." The British and French were inexperienced at sustaining Mach 2.0 speeds, claimed the group, especially since the British had recently cancelled their TSR-2 supersonic fighter program. One task force member noted, "The American SST has great growth potential, the Concorde almost none." According to Enke's group, echoing the 1963 Black-Osborne report, there was still no need for an accelerated American program.¹⁵

By their May 5, 1965 meeting, the PAC members, including a defeated Halaby (who would shortly leave the government), appeared even less troubled than before by the Concorde and more confident of the American SST's ultimate success. McNamara flatly predicted that the American SST would be "far more successful commercially than the Concorde" and that the United States "need not feel the pressure" of a "crash" Concorde effort.¹⁶ The FAA under Halaby was ultimately unable to use the specter of Concorde competition to speed up the American program.

IV. The Re-emergence of the Concorde Threat

American unease over the Concorde, however, refused to vanish completely, and renewed concern began to grow during the latter half of 1965. This development was due to a genuine worry about the Concorde as a threat to American aviation interests and to a reinvigorated FAA lobbying effort to influence PAC members that was directed by two air force generals, William McKee, the new FAA administrator, and Jewell Maxwell, the new director of the SST program.

McKee and Maxwell even momentarily received some analytical support from Enke's group. In August 1965 the task force produced an important study which concluded that the Concorde would displace approximately 25 percent of the 100-odd American SSTs expected to be sold by 1985 under a sonic boom-induced restricted route condition. (Under unrestricted routes, the study found the Concorde offering little competition.) The study also concluded that the Concorde's lower plane-mile costs --in contrast to the Concorde's higher seat-mile costs-- would make the Concorde more suitable for low-density routes and hours; cheaper subsonic airfares would hurt the larger capacity American SST more than the Concorde, as would route restrictions, given the resulting limited demand for SST air travel; British and French production techniques tended to be less capital intensive than American ones. "The U.S. SST needs a relatively large supersonic market," the study reasoned, "which probably means only moderately restricted routes for Concorde competition to be unimportant."¹⁷

The FAA was once again employing a well-planned and effective lobbying campaign that emphasized the Concorde threat. The agency told the PAC in early October 1965 that the gap between time of announced Concorde commercial introduction (1971-1972) and estimated American SST commercial availability (mid-1975) was "sufficient" to assure "an adequate market for the Concorde,"

given a "reasonably economic" Concorde design. The United States "must assume that the Concorde will be a successful program," declared the FAA.¹⁸

Moreover, the notion that the Concorde might be a real future competitor assumed new credence at the October 9 PAC meeting where Osborne and (via Secretary of Commerce John Connor) Boeing reported that the Concorde would actually meet its announced schedule.¹⁹ Media reports helped the FAA.

Although mentioning Concorde cost increases, the aviation press also reported that the technical feasibility of every Concorde system had been "determined" and that the Concorde would fly in March 1968, allegedly giving it two-year edge over any competitor.²⁰ Similarly, an FAA "intelligence summary" for PAC members found Concorde management "operating smoothly," the aircraft's advertised performance data "reasonably valid," and development on schedule; the Concorde's technical systems and design generally possessed "no problems"; the aircraft's range had been extended to 4,150 statute miles with "adequate" fuel reserves; and, holding fifty total orders, airline confidence was "rapidly increasing."²¹

Finally, McKee and Maxwell pressed their campaign by asking the key FAA official for Concorde matters, Raymond B. Maloy, assistant FAA administrator for Europe, Africa, and the Middle East, to prepare an "authoritative view" on the Concorde's competitive position for use at the November 6, 1965 PAC meeting. Although acknowledging major problems with the Concorde in several technical areas, Maloy stressed in his resulting brief the Concorde's "high political significance as representative of the new commitment of Europe to collaborate and cooperate in order to meet the U.S. challenge to the European aircraft industry." According the Maloy, neither the British nor the French, especially Charles de Gualle, would abandon the Concorde, at least through the construction of two prototypes. At the November 6 PAC meeting McKee read verbatim from Maloy's report.

The FAA counter-attack in late 1965, based largely on portraying the Concorde as an effective rival, achieved some success. At the November 6 PAC meeting Black then spoke up in favor of establishing an earlier delivery date for the American SST.²² The PAC concluded in the "annex" to the PAC's third interim report to the president, transmitted on November 15, that the Concorde could "prove to be a serious competitive threat," especially on low-density routes. Still, certain technical difficulties and the Concorde's high operating costs per seat-mile (compared to the American SST) were also mentioned; weight increases in the Concorde's configuration, from 326,000 pounds to about 360,000 pounds, indicated that the aircraft was approaching or had reached "its limit of growth without requiring major redesign."²³

Enke immediately attempted to block the FAA resurgence. In early January 1966 Enke hurriedly flew to Paris and London to meet with high-level French and British officials, ostensibly to deal with various economic and sonic boom research problems, but really to discuss "time phasing" (proportionately slowing down both the Anglo-French and American programs). Unlike the FAA, Enke sent back less than favorable assessments of the Concorde: economic prospects were pessimistic and the airlines were not enthusiastic about the aircraft. Most significant were Enke's reports that the British and French had somewhat different performance and political goals; the Concorde was a matter of pride and national prestige to the French, while the British tended to view the Concorde as price they had to pay to avoid a French veto of British membership in the Common Market. Great Britain, Enke wrote, was the "reluctant partner," with the British mood being one of "fatalistic hopelessness that combined an awareness of financial losses ahead with a belief that little could be done about it." Enke therefore concluded that the time was ripe to explore "time phasing and design differentiation" with the British and French. Then to the FAA's great dismay Enke's

discussions and views were leaked to the British press.²⁴

The FAA quickly counter-attacked, emphasizing the positive aspects of the Concorde's development. It received additional favorable Concorde reviews from TWA, Lockheed, and Boeing, and began systematically to organize and assess Concorde information.²⁵ In a report to the PAC in mid-February 1966 the FAA dwelled on Concorde improvements in range, seat-mile costs, and return on investment. The Concorde program "has not encountered any serious problems which have not been resolved," the FAA commented.²⁶

When the PAC held an informal meeting on March 9, 1966 therefore it was receiving somewhat contradictory signals on the Concorde from Enke, the FAA, the manufacturers, and the airlines.²⁷ But due to the FAA's skillful assembly of favorable information respect for the Concorde had grown and the idea of a Concorde threat had once again come to life.

V. The Concorde Threat Again Recedes

For a period of nine months, from mid-1965 to about March 1966, a reborn fear of the Concorde helped rebuild the stature of the American SST program. But this new respect did not last. The Concorde's image again began to decline in the eyes of key American decision makers (though the FAA continued to portray the Concorde as a great rival and a "serious threat").²⁸ The CIA in late March 1966 reported on the Concorde's engine difficulties, and in late April highlighted a number of other problems.²⁹ At the May 6, 1966 PAC meeting McNamara stated that this negative information demonstrated that although "not a failure," the Concorde "did have a few problems." He added that lack of supersonic experience had led the British and French to underestimate the Concorde's technical difficulties. Both McCone and McNamara once more explicitly warned against letting the Concorde influence American SST development. McCone did not want the Concorde to force an unhealthy "telescoping" of the American effort. McNamara even instructed the FAA to report any instances where the Americans were "doing something differently than they would do it if there were no Concorde."³⁰

As usual, the information on the Concorde that the Americans received---from public and private sources---was contradictory. Some of the data indicated that the Concorde was proceeding smoothly and on schedule, and the FAA particularly was more than willing to believe Concorde claims. The FAA was assisted in early July 1966 by Juan Trippe of Pan American, who told the PAC that the Concorde's timetable was realistic and that its performance characteristics had improved. He pointedly added, "Any place that we [Pan American] don't have such a ship [the Concorde] covered, as more or less a loss leader for advertising purposes and so forth, we think we would be in trouble during the period after Concorde delivery."

But again a basic lack of American confidence in the Concorde program prevailed. The most credible U.S. sources throughout the rest of 1966 stressed the Concorde's long-term problems, such as substantial cost increases, the Europeans' neglect of the sonic boom issue, and the likelihood of a substantial delay.

A fundamental cause for U.S. disregard of the Concorde was that the Americans generally disparaged the entire European aviation industry. Even Juan Trippe spoke of the "miserable performance in Europe compared to what we have done in this country," and admitted that Pan American's Concorde orders were really "a sort of an insurance program" to cover Pan American in the event that an American SST was delayed.³¹

Supporting American poor opinion of European commercial aviation, CIA reports emphasized the Concorde's major technical and nontechnical problems, and, though acknowledging that the Concorde was currently on schedule, warned of "serious" future delays in the Concorde's production phase. The search for solutions to technical problems, according to the CIA, could delay the program for up to two years. Moreover, in the nontechnical area, the CIA dwelled on potentially fatal disagreements between the British and the French; the French, worried about the proposed American SST and unsure of their British partners, wanted to enter production quickly, and rejected a British proposal to increase Concorde passenger capacity to 167; the British, on the other hand, already doubting the Concorde's economic strength, felt that a larger vehicle was needed to compete with the Americans on transatlantic routes, which would require more development time. According to the CIA, like Enke's earlier report, the British had "the uneasy feeling that they are being led into a venture that could prove disastrous." The CIA also emphasized the Concorde's long-term difficulties, its lack of good "growth prospects," and its increasing development costs.³² The powerful U.S. Bureau of the Bureau

also was unconcerned about the Concorde's alleged lead. Enke and his group naturally continued to minimize the seriousness of the Concorde challenge, arguing that even a year's slippage in the American effort would have little impact on American SST sales.³³ At the October 9, 1966 PAC meeting presidential science adviser Donald Hornig added that the Concorde developers had "sort of shut their eyes to the [sonic boom] problem and resigned themselves to at least having the overseas market." Even Maxwell at the FAA admitted to the PAC that "no solutions" had been found for the Concorde's problems; development costs and the sales price were increasing; but so were airline orders.³⁴

Still, the Concorde threat would not go away. As the CIA also acknowledged in October 1966, the Concorde did exist and was apparently on schedule. Moreover, Concorde orders had increased from fifty-four to a tentative sixty-four since August, and the project had assumed a high order of diplomatic political importance. "General de Gaulle," the CIA observed, "continues to view the Concorde as an important step in demonstrating the technical competence required of a major power. He sees the project as a means, also, to enhance French prestige, particularly vis-a-vis the U.S., and has taken a personal interest in it. The [French] government's determination that the project be completed, despite growing British disenchantment [because of mounting costs] also stems from Gaullist assertions that France's 'independent' foreign policy has not harmed its friendship with its allies." As another high French official succinctly stated, "For technological, commercial, and also political reasons, our European countries cannot allow themselves to sink to the level of mere subcontractors." Both the CIA and the FAA's chief official in Europe, Raymond Maloy, continued during the remainder of the year to stress the Concorde's political and technological importance to the French for enhancing national prestige.³⁵

In an even more bullish vein TWA president Charles Tillinghast told the PAC on December 7, 1966 that the Concorde could indeed be a real threat. Although noting that the Concorde had "lousy seat-mile economics" and that TWA "would love to skip the Concorde," he maintained that if the American SST fell further behind, TWA would have no choice but to opt for the Anglo-French aircraft. Tillinghast estimated that TWA could afford at the most an eighteen-month lag. He warned, "The British and French are in. They may have been silly to have done it. They are in. They are going ahead. I think anyone who has a tendency to write off the Concorde as a lot of flop is being very unrealistic. Its economics are considerably less than sensational but it will fly, it will fly well."³⁶

McNamara and McKee agreed at the December 10 PAC meeting that it was a "fair assumption" that the Concorde would be produced, either through a joint Anglo-French effort or, if that should fail, by the French alone. But even the prospect of a Concorde ultimately flying never really struck fear in the hearts of most PAC members---at least not enough fear to accelerate the SST program. McNamara flatly declared on December 10 that the United States was "unduly concerned" and that both the Concorde and the American SST were sure to face serious technical problems and resulting delays. McCone and others agreed.³⁷ The PAC's fourth and final interim report to the president, submitted on December 22, 1966, reflected this view. The report emphasized the technical and economic superiority of the American SST, and observed that many aircraft development problems typically do not become apparent until the prototype stage. The PAC expected "significant delays" with the Concorde, and predicted little performance improvement, given the aircraft's small engine thrust and resulting limited range. The committee also claimed that the Concorde's estimated direct and total operating costs were, respectively, 25 percent and 15 percent higher than those of the American SST and were increasing rapidly.³⁸

In 1967, with the selection of the Boeing-General Electric swing-wing model as the American SST's design at the very end of 1966, the whole U.S. decision-making structure for the SST program began to change significantly. The PAC did not formally meet again after December 1966. Generally SST decisions now became more programmatic, centering on relations with contractors and on technical problems---especially on the fact that the winning swing-wing design was not economic and on the two-year reassessment by Boeing resulting in the firm selecting a new fixed-wing SST design in 1969. High level and wide-ranging policy discussions on such issues as overall design selection, the sonic boom, economic performance, and project financing were infrequent. In the same vein American officials began to view the Concorde more passively, and discussions about the Concorde threat diminished considerably. The FAA continued to monitor the Concorde's development, but the intelligence effort became less focused and more irregular and the CIA's role diminished. In addition, the usefulness of the raw intelligence on foreign SST programs from the CIA and the State Department was questionable, since this data usually added little to what was already know publicly.³⁹

During 1967 and 1968 the dominant American skepticism about the Concorde seemed continually confirmed. By the middle of 1967 the FAA was receiving more news of Concorde delays. British and French Concorde officials appeared to regret their old confident predictions regarding deadlines and costs.⁴⁰ A group of American aviation experts who visisted Concorde facilities in the summer of 1967 reported increases in gross weight, limitations in basic engine size, and diminished fuel capacity. Maloy too called attention to these problems and to the Concorde's increased noise. By November 1967 even TWA, whose chief executive had stressed the Concorde's competitive strength to the PAC the previous December, was, in Maxwell's words, "not at all enchanted with the Concorde." TWA decided not to reserve additional Concorde delivery

positions and told Maxwell that it might even drop the six positions that it held if the aircraft's performance levels slipped further.⁴¹

Although the first Concorde prototype was unveiled on December 11, 1967 at Toulouse, France, there were new delays in 1968 for a variety of reasons, including technical problems, management changes and resignations, strikes, and a crash of a jet fighter that was simulating Concorde flight characteristics. (The FAA and its SST contractors worked strenuously to counter the resulting publicity from the unveiling. Boeing contacted twenty "media people" in Washington, D.C.---including representatives from the Washington dailies, the three major television networks, Time, Newsweek, and the Wall Street Journal---to supply them with background information and a picture of the newly designed American SST.) Concorde officials had predicted that the Concorde would fly before the end of 1968. But the year came and went without the aircraft taking to the air.⁴² Air India cancelled its option for two Concordes while retaining its two delivery dates for the American SST. The airline said that the later American entry was actually beneficial because it would allow time for assessing equipment needs.⁴³

Still, the Americans could not deny the Concorde's progress, and by mid-1968 SST program director Maxwell once more started to refer to Concorde threat in promoting the SST program. In late June 1968 he told Rep. Philip Philbin (D-Massachusetts) that the Concorde was making progress, that a first prototype was "being readied" for flight in France, and that a second was being built in Great Britain and was "nearly complete." Maxwell reminded the congressman that the British and French governments had committed over \$2 billion to the Concorde in the form of subsidies, loans, and loan guarantees and that the Concorde could possibly enter commercial service in the early 1970s, "three to four years ahead of our U.S. SST." Two months later Maxwell declared that "too much emphasis has been placed on Concorde problems and not

enough on Concorde progress."⁴⁴

Maxwell's new emphasis seemed valid. With great fanfare the French rolled out their prototype for its first taxiing trials on September 20, 1968. (Unfortunately for the French, Soviet troops in Czechoslovakia stole the headlines in the next day's papers). In contrast, the British prototype was unveiled in Britain at about the same time with a minimum of publicity. Finally, after a frustrating series of further delays in early 1969, a Concorde prototype flew twenty-seven miles over France on March 2.⁴⁵

American views about the Concorde grew more complex during the Nixon administration, which began in January 1969. On the one hand, doubts continued, despite the success of the Concorde flight; reports on payload, fuel consumption, and aircraft sales were pessimistic. Similarly, also about this time, an interagency Ad Hoc Review Committee, which President Nixon established to examine the whole American SST program, like the now-defunct PAC and the 1963 Black-Osborn report, did not take the Concorde very seriously. One member, Undersecretary of the Treasury Paul Volcker, believed that the Concorde posed no serious threat to American leadership in aviation, that it would not create a burden on American balance of payments, and that it should not be "an overriding factor in the consideration of our SST project."⁴⁶

But at the same time respect for the Concorde as a potential rival was increasingly voiced and the Nixon administration generally viewed the Concorde much more favorably than its predecessors. By early April 1969 the French prototype had completed eight flights and had flown a total of ten hours, and on April 9 the British Concorde prototype made its first successful flight. One experienced observer characterized the British prototype's performance as "good, standard, easy takeoff."⁴⁷ In mid-August Transportation Secretary John A. Volpe, who had emerged as an important SST advocate now that the FAA

and the SST program were part of his department, reported to President Nixon that the Concorde test-flight phase was "progressing satisfactorily," with British confidence holding firm. On October 1 the French prototype flew at supersonic speeds for the first time. It was the aircraft's forty-fifth flight.⁴⁸ One SST program official remarked that in spite of skeptical views from the Ad Hoc Review Committee, the Concorde and even the Russian TU-144 SST had been successful. The SST Office believed that the Concorde would be "a viable commercial aircraft" and would be operational in 1973. Similarly, in early May 1970 Undersecretary of State Alexis Johnson declared that the Concorde program was progressing favorably, with twelve airplanes authorized for construction; consideration was being given to a "second generation" Concorde, which would be comparable in size and economic performance to the American SST design.⁴⁹

But American officials continued to ignore any opportunity for collaboration between the two SST efforts. The totally different design philosophies of the Americans and the Europeans---and the Americans' commitment to being the sole technological and market leader in aviation---precluded any meaningful technical cooperation. Fundamental differences about the importance of the sonic boom and noise issues also kept the programs apart. Unlike the Americans, the British and French consistently discounted the significance of these problems.⁵⁰

VI. Conclusion

In summary, the mere existence of the Concorde project was an important political and bureaucratic weapon for the American SST advocates and helped keep the U.S. effort alive for several years. This was especially the case during periods when the Concorde was winning a certain amount of grudging American respect, such as immediately after the Concorde announcement in November 1962, during the mid-1965-March 1966 period, and in the early Nixon administration. Still, most U.S. officials, as reflected especially by the PAC, were consistently skeptical about the Concorde's strength as a competitor, and the successive delays in the Concorde program appeared to confirm these doubts. Competition from the Concorde generally was not viewed seriously, and most American decision makers---but by no means all---believed that a two- or three-year gap was tolerable. The idea of a foreign threat was never compelling enough to accelerate the American SST program; but this argument was crucial at times in helping the SST proponents successfully withstand strong and credible attacks from SST critics.

Ultimately, however, the shield based national prestige and on the threat of serious international competition was unable to prevent defeat of the program in the face of attacks based on other factors. Experienced project managers in the SST program were caught by surprise. The real threat to the program was at home where other societal forces in the late 1960s were transforming the SST program into a mass political issue. Foreign competition and national prestige could not stall the significant change in attitude and values toward technology and government programs that was undermining the rationale and support for programs like the SST. The SST was both a victim of this massive change of views and a catalyst for it. With the SST's defeat in 1971 a new technological era had fully emerged.

NOTES

The primary documents listed in the notes come from the following archives or files:

- A. The records of the Office of Supersonic Transport Development of the Federal Aviation Administration, stored in the Federal Records Center, Suitland, Maryland. The accession numbers are: (a) 237-69A-1647. There are 35 boxes in this set. Boxes numbered 1 through 13 were used. Indicated by the symbol FAA 1647, followed by a slash and the box number; (b) 237-72A-6174. There are 151 boxes in this set. Boxes number 1 through 14 and 92 through 97 were used. Indicated by the symbol, FAA 6174 followed by a slash and the box number; (c) 237-70A-905. There are 11 boxes in this set. Boxes number 1 and 2 were used. Indicated by the symbol, FAA 905, followed by a slash and the box number.
- B. Documents from the files of the FAA Historian, Washington, D.C.
- C. Records of the President's Advisory Committee on Supersonic Transport (PAC). At the time I examined these documents,, they had just been transferred from the Department of Defense to the National Archives, Washington, D.C. The accession number of these documents at that time was 69-A-2789. Record Group 330. There are 50 boxes in this set. Boxes numbered 4 through 16, 21, 23 through 25, 28, 29, 32, 34 through 37, 41, and 44 through 50 were used. Indicated by the symbol, PAC, followed by a slash and the box number.
- D. Various documents stored in the John F. Kennedy Presidential Library, Boston, Massachusetts, from the President's Office Files.

- E. Various documents stored in the Lyndon B. Johnson Presidential Library, Austin, Texas, from the following collections: White House Central Files; Vice Presidential papers; Administration FAA History (FAA Admin. Hist. -- SST and accompanying documents); and the Office Files of George Reedy.
1. For a review of the literature on managing large-scale programs, see: Mel Horwitch, "Designing and Managing Large-Scale, Public-Private Enterprises: A State-of-the-Art Review," Technology in Society, 1 (Fall, 1979), pp. 179-192. For the use of protective shields and their decline, see: Mel Horwitch and C. K. Prahalad, "Managing Multi-Organization Enterprises: The Emerging Strategic Frontier," Sloan Management Review, Winter, 1981, pp. 3-16.
 2. For a comprehensive history of the SST conflict, see: Mel Horwitch, Clipped Wings: The American SST Conflict (Cambridge, Mass: The MIT Press, 1982).
 3. U.S., Congress, House, Committee on Appropriations, Independent Offices Appropriations, 1962, Hearings, 87th Congress, 1st Session, 4/17/61, pp. 85-86. For the American rejection of European suggestions for SST collaboration see: Thorneycroft to Halaby, 3/7/61, FAA 6174/14; "AM" to Halaby, 3/10/61, note, FAA 6174/14; "Summary of 3/7/61 Letter," 3/13/61, FAA 6174/14; Preuss to Halaby, "Thorneycroft Correspondence," 3/16/61, memo, FAA 6174/14; Halaby to Thorneycroft, 3/20/61, FAA 6174/14.

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5. Najeeb Halaby, Crosswinds: An American's Memoir (Garden City, N.Y.: Doubleday, 1978), p. 192.
6. Halaby to the President, "Mr. Juan Trippe and the U.S. Government," 6/31/63, memo, FAA Historian's Files; Pan American Airlines press release, 6/4/63, 5 P.M., FAA 6174/12; untitled and undated draft of Pan American press release on Concorde purchase, JFK Pres. Office Files; Warnick to Halaby, 6/4/63, request, FAA 6174/12; L.L. Dity, "Concorde Order Spurs U.S. SST Action," Aviation Week and Space Technology, 6/10/63, p. 40, and "U.S. Participation in Concorde Proposal," Aviation Week and Space Technology, 6/17/63, p. 40.
7. For Halaby's views on JFK and LBJ, see: Najeeb Halaby, Crosswinds: An Airman's Memoir, pp. 156, 160; Richard Kent, Jr., "Interview with N. E. Halaby," 7/30/75, New York, N.Y., pp. 9, 47-50, FAA Historian's Files. For Johnson's pro-SST views, see: Johnson to Keith Kahle, 6/13/63, LBJ V-P; Johnson to S. G. Tipton, 6/11/63, LBJ V-P; Johnson to C. R. Smith, 8/7/63, LBJ V-P; Johnson to Lt. Gen. Ira C. Eaker, USAF (Retired), 6/18/63, LBJ V-P; Edited dictaphone recording, 3/3/63, pp. 24-26, LBJ Office Files of George Reedy box.
8. Eugene Black and Stanley de J. Osborne, "Report on the Supersonic Transport," 12/19/63, Baker Library, Harvard Business School.
9. "Executive Order Establishing the President's Advisory Committee on Supersonic Transport," 4/1/64, LBJ EX FG.
10. Raymond B. Maloy to Deputy Administrator, "History of the Supersonic Transport Program--International," 11/2/26, memo, FAA Historian's Files.

11. Maloy to Deputy Administrator, "History of the Supersonic Transport Program--International," 11/22/66; Califano to McNamara. "Supersonic Transport Advisory Committee." 11/6/64, memo, pp. 7-10. PAC/10.
12. D. J. Haughton to Halaby, 1/1/65, and attached, "Lockheed Comments on FAA Concorde Paper of October 1, 1964," FAA 6174/95.
13. "Tripartite Meeting between Ministers Jacquet, Jenkins and Mr. Halaby" (minutes of the meeting of 2/16/65), LBJ FAA Hist. Doc.
14. "Draft Proceedings of the President's Advisory Committee on Supersonic Transport," 3/30/65, pp. 1-7, 77-79, PAC/10.
15. For the anti-Concorde views of Enke and his group, see: Enke, "The SST Venture--Issues and Questions." SST 1965 Task Force Internal Paper, no. 1, 4/12/65, pp. 24-28, PAC/41; Enke, "The Profitability and Place of Supersonic in Air Transport (an Interim Statement)," SST 1965 Task Force Internal Paper, no. 13, 4/29/65, revised 5/6/65, pp. 12-14, PAC/41; D. J. Edwards. "Some Aspects of SST Development," SST 1965 Task Force Internal Paper, no. 9, 4/29/65, pp. 3-6, PAC/14; DOD, "Memorandum for the President's Advisory Committee on Supersonic Transport," 5/1/65, memo, pp. 13-14, PAC/11. For the TSR-2 cancellation, see: Richard J. Kent, Jr.. Safe, Separated, and Soaring (Washington, D.C.: U.S. Government Printing Office, 1980), p. 140.
16. "Draft Proceedings of the President's Advisory Committee on Supersonic Transport," 5/5/65, pp. 9-19, PAC/32.
17. SST Economics Task Force. "The Economics of a U.S. Supersonic Transport (Report of Findings to Date)," 8/20/65, pp. 30-33, PAC/25.
18. FAA briefing material on "Agenda Item No. 4" for the 10/9/65 PAC meeting, FAA 6174/66.
19. "Draft Proceedings of the President's Advisory Committee on Supersonic Transport," 10/9/65, pp. 3-7, 45-47, PAC/32.

20. Herbert J. Coleman, "Concorde Hews to Schedule for First Flight in March 1968," Aviation Week and Space Technology, 10/25/65, pp. 130-133.
21. FAA, "Concorde Intelligence Summary," 10/29/65, FAA 6174/96; Maxwell to Steadman, 10/29/65, FAA 6174/96.
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23. "Memorandum to the President, Third Interim Report of the President's Advisory Committee on Supersonic Transport," and "Annex," 11/15/65, PAC/3.
24. For Enke's trip to Europe and the FAA's reaction to it, see: Enke, "Continued Interest of French and British Officials in an Agreement with the U.S. to Rationalize SST Competition," 1/24/65, PAC/13; Maloy to Deputy Administrator, "Visit of Dr. Stephen Enke, Deputy Assistant Secretary, Department of Defense, to Paris, January 10-11, 1966," 2/2/66, memo, and attached, Maloy, circa early 1/66, cable, and article from 1/2/66 issue of the Economist, "Washington's Supersonic Offer." FAA 6174/96; Maxwell to Steadman, 2/2/66, FAA 6174/96.
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26. FAA, "Summary Status Report to the President's Advisory Committee on Supersonic Transport," 2/15/66, p. 9, PAC/13.

27. For PAC views and decisions in March 1966, see: Maxwell to the record, "Meeting of President's Advisory Committee for Supersonic Transport Members," 3/10/63, memo, FAA 6174/96; McNamara to McKee, and attached, "Agreements Reached at Informal March 9 Meeting of Several Members of the PAC-SST," PAC/13. For Enke's views in March, see: Enke to McNamara, "Rationalizing SST Competition: Some British Interest," 2/25/66, memo, PAC/13; Enke to McNamara, "Important Matters Requiring Voter Attention," 2/25/66, memo, PAC/36; Enke to McNamara, 3/3/66, memo, PAC/13.
28. FAA, "The Effect of a Longer Interval Between the Concorde and the U.S. Supersonic Transport," and "Concorde Impact on SST Schedules" (reports to the PAC for the 7/9/66 PAC meeting), PAC/4.
29. For the March 1966 CIA study, see: Enke to McNamara, "Preparations for May 6 PAC/SST Meeting," 4/29/66, memo, PAC/1; FAA, "Summary Status Report to President's Advisory Committee on Supersonic Transport," 6/20/66, p. 39, PAC/32.
30. "Draft Proceedings of the President's Advisory Committee on Supersonic Transport," 5/6/66, pp. 9-12, 16, 19-28, 76, PAC/32.
31. For various reports on the Concorde received by the FAA, see: B. J. Vierling to Maloy, "Concorde Program," 5/17/66, memo, FAA 1647/3; Lockett to Vierling, "Accuracy of Sud/BAC Discussion with Aviation Space Writers, May 23, 1966," 6/6/66, memo, FAA 1647/6; "Concorde Aircraft," 6/7/66, DOD Intelligence Information Reports, Nos. 1-836-0258-66 and 1-832-01135-66, FAA 1647/7; Maloy to FAA, Washington, D.C., 6/29/66, telex, FAA 1647/6; American Embassy, London to Secretary of State, "Civair," 9/9/66, DOS cable, FAA 1647/7; Clifton F. von Kann to Maxwell, "Visit to British Aircraft Corporation Facilities at Bristol, England," 9/14/66, memo, FAA 1647/3; Maxwell to von Kann, 9/22/66, 9/30/66, FAA

- 1647/3. For Trippe's comments, see: "Draft Proceedings of the President's Advisory Committee on Supersonic Transport," 7/9/66, pp. 7-9, 19-20, PAC/32.
32. FAA, "Summary Status Report to President's Advisory Committee on Supersonic Transport," 6/30/66, pp. 30-40, 8/31/66, PAC/32; Steadman to McNamara, 9/2/66, memo, PAC/14; Maxwell to McNamara, "Foreign Supersonic Transport Programs--Status Report," 11/7/66, memo, and attached, "Foreign Supersonic Transport Programs--Status Report," 10/27/66, PAC/4.
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34. "Draft Proceedings of President's Advisory Committee on Supersonic Transport," 10/6/66, pp. 15, 27-29, PAC/32.
35. Maxwell to McNamara, "Foreign Supersonic Transport Programs--Status Report", 11/7/66, memo, and attached, "Foreign Supersonic Transport Programs--Status Report," 10/27/66, PAC/4; Donald F. Chamberlain, CIA Director of Scientific Intelligence, to Office of Supersonic Transport Development, FAA, "Concorde Product Negotiations," 12/8/66, memo, PAC/15; E. Drexel Godfrey, Jr., CIA Director of Current Intelligence, to Office of Supersonic Transport Development, FAA, "FAA Request for Political Evaluation of the Concorde Project as Related to British Entry in the EEC," 12/9/66, memo, PAC/15.
36. "Draft Proceedings of President's Advisory Committee on Supersonic Transport," 12/7/66, pp. 27-33, 49-62, 74-75, PAC/32.
37. "Draft Proceedings of President's Advisory Committee on Supersonic Transport," 12/10/66, pp. 13-14, 17-21, 28-36, 49-50, 54-55, PAC/32.
38. "Memorandum to the President: Fourth Interim Report of the President's Advisory Committee on Supersonic Transport," 12/22/66, PAC/32.

39. For the more passive and less useful intelligence on the Concorde after 1966, see: Lockett to Assistant for System Integration, et al., "SST Intelligence," 2/15/67, memo, FAA 1647/9; Charles O. Cary to Maxwell, "Foreign SST Intelligence," 3/68, memo, FAA 905/2; John J. Carroll to Frank Sheridan (CIA), 8/2/68, FAA 6174/1; Maxwell to Cary, "Classified Foreign SST Developments Report Dated April 2, 1968," 4/12/68, memo, FAA 1647/12.
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43. Secretary of State to the American Embassy, New Delhi, "CIVAIR-Air India Concorde Options," 3/26/68, DOS cable, FAA 905/2; U.S. Embassy, New Delhi to the Secretary of State, "CIVAIR-Air India Concorde Options," 4/4/68, DOS cable, FAA 905/2; Lockett to the files, "Concorde Options," 4/9/68, memo, FAA 905/2.
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