THE ORIGINS OF U.S. SPACE POLICY:

EISENHOWER, OPEN SKIES, AND FREEDOM OF SPACE

R. Cargill Hall

During World War II, America's civilian and military leadership embraced scientific research for a multitude of advanced weapons.[1] Indeed, at war's end in 1945, General H. H. Arnold, commander of the Army Air Forces, could confidently assure Secretary of War Robert Patterson that the United States would shortly build long-range ballistic missiles to deliver atomic explosives and "space ships capable of operating outside the atmosphere."[2] Thirteen years later, both of the programs that Arnold forecast were underway. This period, the immediate prelude to the space age, spawned America's civil and military space programs--programs that were in the beginning opposite sides of the same coin. Elements of these programs, authorized and framed by one American president, would become instrumental in forewarning of surprise attack, monitoring compliance with international treaties, and maintaining a delicate peace between the Soviet Union and the United States. For contemporary reasons of national security, the executive action that shaped this enterprise and the space policy that President Dwight D. Eisenhower and his advisors created for it were obscured even to many of those directly involved.

Beginnings of the American Space Program

When in late 1945 General Arnold counselled the Secretary of War on prospective weapon developments, he also acted to ensure that the Army Air Forces would in future be equipped with modern weapons superior to any held by a potential adversary. The Army Air Forces commander set up an independent consultant group, Project RAND,[3] to perform operations research and

---

[1] Daniel J. Kevles, The Physicists. (New York: Vintage Books, 1979), Chapters 19 and 20.

[2] General H. H. Arnold, Third Report of the Commanding General of the Army Air Forces to the Secretary of War, USAAF, 12 November 1945, p. 68.

[3] Project RAND was contracted to the Douglas Aircraft Company in Santa Monica, California. The acronym is thought by some old-timers to mean Research AND Development, and by others: Research for America's National Defense. Whatever the case, in subsequent years only the first letter of Rand was

Accession Number: 4297

Publication Date: Jan 01, 1992

Title: Origins of U.S. Space Policy: Eisenhower, Open Skies, and Freedom of Space

Personal Author: Hall, R. C.

Descriptors, Keywords: US Space Policy Program Project Rand Eisenhower Origin

Pages: 00028

Cataloged Date: Feb 04, 1993

Document Type: HC

Number of Copies In Library: 000001

Record ID: 26171

provide advice. To guide a formative Rand and oversee aeronautical research, he created a new position at headquarters, that of Deputy Chief of Air Staff for Research and Development. Arnold selected for this position a young man with a reputation for accomplishing difficult assignments, Major General Curtis E. LeMay.[4]

During 1946 and 1947, at a time of demobilization and declining budgets, LeMay directed improvements in research and development. In March 1946, among the first investigations at Project Rand, he asked for an engineering analysis of an Earth satellite vehicle[5] after learning of a similar investigation at the Navy Bureau of Aeronautics.[6] He wanted the Rand evaluation completed swiftly, in time to match the Navy presentation scheduled for the next meeting of the War Department's Aeronautical Board.[7] Representatives of the Army Air Forces and the Navy presented their preliminary findings at a 15 May 1946 meeting of the board's Research and Development Committee. Although Rand engineers ruled out the satellite as a weapons carrier, they claimed for it a number of important military support functions including meteorological observation of cloud patterns and short-range weather forecasting, strategic reconnaissance, and the relaying of military communications.[8] The Navy representatives likewise emphasized using Earth satellites in defense support applications: for fleet communications and as a navigation platform from which to guide missiles and pilotless aircraft.[9] The military members, however, could not

---

normally capitalized in references outside the organization, a practice followed hereafter in this work.

[4] Bruce L. R. Smith, The Rand Corporation: Case Study of a Non-profit Advisory Corporation. (Cambridge, Mass: Harvard University Press, 1966), pp. 40-47.

[5] Curtis E. LeMay with Mackinlay Kantor, Mission with LeMay: My Story. (Garden City, NY: Doubleday & Co., In., 1965), pp. 399-400.

[6] R. Cargill Hall, "Earth Satellites, A First Look by the United States Navy," in R. C. Hall, ed., History of Rocketry and Astronautics: Proceedings of the Third through the Sixth History Symposia of the International Academy of Astronautics. (San Diego, CA: Univelt Inc., 1986), AAS History Series, Vol 7, Part II, pp. 253-278.

[7] The Aeronautical Board, formed during World War I and eventually made up of ranking military members of the army and navy air arms, reviewed aeronautical developments and attempted to reconcile "the viewpoints of the two services for the mutual benefit of aviation." The Earth satellite proposals passed from the Aero Board to the War Department's Joint Research and Development Board (JRDB) in early 1947 and, in late 1947 to the JRDB's successor, the Research and Development Board (RDB) in the newly-established Department of Defense. Civilian scientists directed and were well represented on the JRDB and RDB, which evaluated and approved all missile and aeronautical research and development within the military departments, and attempted, often without success, to prevent duplication of effort.

[8] Robert L. Perry, Origins of the USAF Space Program, 1945-1956. AFSC Historical Publications series 62-24-10, 1961, Chapter 2; Project RAND, Preliminary Design of an Experimental World-Circling Spaceship. (Santa Monica, CA: RAND Report No. SM-11827, 12 May 1946), *passim*.

[9] Research and Development Committee, Aeronautical Board, Case No. 244, Report No. 1, 15 May 1946, pp. 1-2.

agree on a joint satellite program or confirm that these uses of an Earth satellite would justify the anticipated costs of building, launching, and operating such a vehicle.

Studies of automatic Earth satellites continued at Rand and the Navy Bureau of Aeronautics while the postwar armed services jockeyed for position in a sweeping military reorganization. President Truman signed the National Security Act on 26 July 1947 that created the National Military Establishment and separate military departments of the Army, Navy, and Air Force. Beginning in September 1947 the three service secretaries reported to a new cabinet officer, the Secretary of Defense. But the reorganization did not immediately assign to any of the military services responsibility for new weapons. A newly-formed Research and Development Board in the Department of Defense postponed any decisions of service jurisdiction over deployment or control of intermediate range and intercontinental ballistic missiles, rockets that would be required to propel man-made satellites into Earth orbit.[10]

The Research and Development Board inherited supervision of the satellite studies in the defense department, and assigned them in December 1947 to its Committee on Guided Missiles. This committee, in turn, formed a Technical Evaluation Group composed of civilian scientists to evaluate the Navy and Air Force programs and recommend a preferred course of action. Chaired by Walter MacNair of Bell Laboratories, on 29 March 1948 the group delivered its findings and recommendation. The members judged the technical feasibility of an Earth satellite to be clearly established; they concluded, however, that neither service had as yet established a military or scientific utility commensurate with the vehicle's anticipated costs. Consequently, the group recommended deferring construction of Earth satellites and consolidating all further studies of their use at Rand.[11] Adopted by the Research and Development Board, these recommendations ended Navy satellite work for a number of years and focused the study of military satellites at Rand's headquarters on the West Coast, in Santa Monica, California.[12]

---

[10] Charles S. Maier, "Introduction," to George B. Kistiakowsky, A Scientist at the White House: The Private Diary of President Eisenhower's Special Assistant for Science and Technology. (Cambridge, MA: Harvard University Press, 1976), pp. xxxiii-xxxiv; also Kistiakowsky at pp. 95-96; cf., Max Rosenberg, The Air Force and the National Guided Missile Program, 1944-1950. (USAF Historical Division Liaison Office, 1964), pp. 22, 63, 84-85.

[11] "Satellite Vehicle Program," Technical Evaluation Group, Committee on Guided Missiles, RDB, GM 13/7, MEG 24/1, 29 March 1948.

[12] In 1948 Project Rand reorganized as a non-profit consulting firm, The Rand Corporation. In Washington, the defense department's Research and Development Board continued fitfully to operate until the fall of 1953 when its functions were subsumed in a new Office of Assistant Secretary of Defense for Research and Development; President Dwight D. Eisenhower appointed its first occupant: Donald A. Quarles.

Rand's Earth satellite work in the late 1940s and early 1950s embraced system and subsystem engineering design, the preparation of equipment specifications, and studies of military uses. It attracted a host of uncommonly able individuals, among them James Lipp, Robert Salter, Merton Davies, Amron Katz, Edward Stearns, William Kellogg, Louis Ridenour, Francis Clauser, and Eugene Root. Luminaries from academe, such as Bernard Brodie and Harold Lasswell of Yale University and Ansley Coale of Princeton, participated in special conferences like the one held at Rand in 1949 that surveyed the prospective political and psychological effects of Earth satellites.[13] All of these men had a hand in shaping the formative space program. And all of them could agree by the early 1950s that the most valuable, first-priority use of a satellite vehicle involved one strategic application: a platform from which to observe and record activity on the Earth.

Back in November 1945, with nuclear weapons and turbojet aircraft at hand, General Arnold concluded that the next war would provide the country little opportunity to mobilize, much less rearm or train reserves. The United States could not again afford an intelligence failure like the one at Pearl Harbor; it could not again be caught unaware in another surprise attack. In future, he had cautioned Secretary of War Patterson, "continuous knowledge of potential enemies," including all facets of their "political, social, industrial, scientific and military life" would be necessary "to provide warning of impending danger." Arnold knew well that defensive, pre-hostilities reconnaissance was but one side of a double-edged sword; the other edge cut straight the way for offensive strategic aerial warfare: "The targets of the future may be very large or extremely

---

[13] Rand Research Memorandum, RM-120, "Conference on Methods for Studying the Psychological Effects of Unconventional Weapons," 26-28 January 1949; and Paul Kecskemeti, RM-567, "The Satellite Rocket Vehicle: Political and Psychological Problems," 4 October 1950; see also, R. Cargill Hall, "Early U.S. Satellite Proposals," Technology and Culture, Vol IV, No. 4, Fall 1963, pp. 430-431.

Five months after an atomic bomb fell on Hiroshima, Japan, Louis Ridenour provided the American public a first, sobering assessment of future international atomic warfare conducted with Earth-mines and Earth-orbiting satellites. (In the 1950s, fears of a nuclear/thermonuclear surprise attack would move President Dwight Eisenhower to fold Earth satellites into an intelligence system designed to preclude such a catastrophe, *and* establish policy ensuring that space flight operations remained devoted to "peaceful purposes.") See L. N. Ridenour, "Pilot Lights of the Apocalypse," and the editor's introductory comment, in Fortune, Vol 33, January 1946, pp. 116-117, 219.

Robert Salter contributed one of the first and most prescient surveys of the prospects for manned space flight in 1951, though the title he selected for it, doubtless to avoid peer ridicule, belied the subject. See R. M. Salter, "Engineering Techniques in Relation to Human Travel at Upper Altitudes," in Clayton S. White and Otis O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere: A Study of the Aeropause (Report of a Symposium Sponsored by the USAF School of Aviation Medicine and the Lovelace Foundation for Medical Education and Research. Held at San Antonio, Texas, November 6-9, 1951). (Albuquerque, NM: University of New Mexico Press, 1952), pp. 480-487.

small--such as sites for launching guided missiles," he declared. Identifying them, like advance warning, also required "exact intelligence information."[14]

The extreme secrecy that cloaked events within the Soviet Union promoted the focus on intelligence gathering. When relations between the United States and the USSR soured after World War II, little information about contemporary Soviet military capabilities existed in the West. In the absence of hard facts in the late 1940s, American leaders acted on their perception of a "growing intent toward expansion and aggression on the part of the Soviet Union."[15] Shortly after the Soviets detonated an atomic bomb in 1949, the newly-formed Board of National Intelligence Estimates in the Central Intelligence Agency (CIA) warned of the possibility of a Soviet nuclear surprise attack, albeit a limited one, against the United States. That prospect, underscored by the surprise Korean conflict in June 1950 and the development of thermonuclear devices between 1952 and 1954, haunted the nation's military and civilian leadership.[16]

Among America's leaders in the 1950s, the desire to preclude a nuclear or thermonuclear surprise attack was particularly acute. As Dwight D. Eisenhower's biographer aptly phrased it, they had "Pearl Harbor burned into their souls in a way that younger men, the leaders in the later decades of the Cold War, had not." Certainly this was true of Eisenhower in 1953 when he took the oath of office as President, for the subject completely dominated his thinking about disarmament and relations with the Soviets for the next eight years. Besides seeking ways to prevent a surprise attack, Eisenhower also sought "to lessen, if he could not eliminate, the financial cost and the fear that were the price of the Pearl Harbor mentality."[17] To that end, he could agree entirely with General Arnold's views that continuous knowledge of one's potential adversaries was essential "to provide warning of impending danger." The way to get it, Eisenhower also knew from wartime experience, was through aerial reconnaissance.

To secure hard intelligence about the Soviet Union, the CIA and the Air Force undertook at the beginning of the 1950s a variety of projects. Intelligence officers sifted captured German

---

[14] Arnold, Third Report of the Commanding General, pp. 65-67.

[15] Harry R. Borowski, A Hollow Threat: Strategic Air Power and Containment Before Korea. (Westport, CT: Greenwood Press, 1982), p. 6; see also, John Prados, The Soviet Estimate: U.S. Intelligence Analysis and Russian Military Strength. (New York: The Dial Press, 1982), pp. 6-8, and 19.

[16] James R. Killian, Jr., Sputnik, Scientists, and Eisenhower: A Memoir of the First Special Assistant to the President for Science and Technology. (Cambridge, MA: The MIT Press, 1977), pp. 68, 94; Prados, The Soviet Estimate, p. 21.

[17] Stephen E. Ambrose, Eisenhower: Volume II, The President. (New York: Simon and Schuster, 1984), p. 257. The president's decision in favor of aerial reconnaissance is explained on pp. 258-259.

documents for aerial reconnaissance photographs of the USSR; that these photographs dated from the early 1940s suggests the magnitude of the problem facing American planners. The interrogation of German and Japanese prisoners of war returning from forced labor in the Soviet Union between 1949 and 1953 helped shed somewhat more light on the status of that country's military and industrial might. The Strategic Air Command began flying aircraft about the periphery of the USSR on reconnaissance missions, and obtained considerable information about border installations and defenses. But these missions yielded nothing substantial about the Soviet heartland and the state of its economy, society, or military capabilities and preparations.[18]

Seeking this information, The Rand Corporation proposed and the Air Force conducted the WS [Weapon System] 119L program. Beginning in early January 1956, with the approval of President Eisenhower, Air Force personnel loaded automatic cameras in gondolas suspended beneath large Skyhook weather balloons, and during the next four weeks launched 516 of these vehicles in Western Europe. The balloons, equipped with radio beacons that allowed tracking, drifted on prevailing winds at high altitudes eastward across the Eurasian continent, through Soviet airspace. Under the terms of international law to which the United States was a party, the balloons clearly violated Soviet national sovereignty. Those that succeeded in crossing released their gondolas on parachutes, which were recovered in mid-air by C-119 cargo aircraft near Japan and Alaska.[19] Because the aerial path of the balloons could not be controlled, however, the pictures might as easily be of cloud cover or a Siberian forest, as of a factory or an airfield. This program, which produced limited intelligence and strongly-worded Soviet protests, was quietly cancelled on 6 February 1956 at the president's direction. Although the Air Force would subsequently launch a few more of these balloons that operated at yet higher altitudes, Eisenhower quickly terminated that effort, too. Meanwhile, other, more promising avenues of gathering information had appeared.[20]

---

[18] David A. Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy, 1945-1960," International Security, Vol 7, No. 4, Spring 1983, pp. 20-21; Prados, The Soviet Estimate, pp. 57-58.

[19] In the event aerial retrieval failed, the gondolas were designed to float on the ocean's surface and radiate a signal for twenty-four hours. Although many of the gondolas came down in the Soviet Union, sixty-seven of them actually reached the recovery area; of these, the Air Force retrieved forty-four.

[20] Tom D. Crouch, The Eagle Aloft: Two Centuries of the Balloon in America. (Washington, DC: Smithsonian Institution Press, 1983), pp. 644-649; Ambrose, Eisenhower, Vol II, pp. 309-311; Killian, Sputnik, Scientists, and Eisenhower, p. 12; Paul E. Worthman recollections, cited by W. W. Rostow in Open Skies: Eisenhower's Proposal of July 21, 1955. (Austin TX: University of Texas Press, 1982), pp. 189-194. Project "Moby Dick," the test of WS 119L, was conducted in the United States between 1952-1955 and accounted for numerous UFO sightings--as did later tests of the U-2 and SR-71.

Research and Initial Development

While the CIA and the Air Force endeavored to gather information about the Soviet Union from whatever the source, the Department of Defense acted on the issue of military roles and missions. On 21 March 1950, Secretary of Defense Louis Johnson assigned to the Air Force responsibility for long-range strategic missiles, including ICBMs. A few weeks later the Research and Development Board vested jurisdiction for military satellites in the same service. With these responsibilities, Air Force leaders directed Rand to complete studies of a military Earth satellite.[21] The resultant Rand report, issued in April 1951, described a spacecraft fully stabilized on three-axes, one that employed a television camera to scan the Earth and transmit the images to receiving stations. The television coverage thus acquired, Rand reminded the service, had to occur when "weather permits ground observation."[22] The Rand report encouraged Air Force leaders to believe that directed, periodic observation of the Soviet Union might soon be conducted from extremely high altitudes. To confirm these findings, on 19 December 1951 Headquarters USAF authorized the firm to subcontract for detailed spacecraft subsystem studies. And a few weeks later, in January 1952, the service convened a seminal "Beacon Hill" study group to assay strategic aerial reconnaissance under the auspices of Project Lincoln at the Massachusetts Institute of Technology.[23]

The Beacon Hill Study Group, which first met between 7 January and 15 February 1952, considered improvements in Air Force aerial intelligence processing, sensors, and vehicles. Chaired by Carl Overhage of Eastman Kodak, the fifteen-member group included Air Force optics specialist Lieutenant Colonel Richard Leghorn (later, the founder of Itek), James Baker of the Harvard Observatory, Edwin Land (the founder of Polaroid), Stuart Miller of Bell Labs, Richard Perkin (co-founder of Perkin-Elmer), scientific consultant Louis Ridenour, Allen Donovan of Cornell

---

[21] Enclosure with recommendations for guided missiles to Memo 1620/17, for Secretary of Defense Louis Johnson, from the Joint Chiefs of Staff, 15 March 1950; Memo for the Joint Chiefs of Staff from Louis Johnson, "Department of Defense Guided Missiles Program," approving recommendations, 21 March 1950; Rpt, Air Research and Development Command, Space System Development Plan, WDPP-59-11, 30 January 1959, Tab I, "Background," p. I-1-1.

[22] Rpt, The RAND Corporation, Utility of a Satellite Vehicle for Reconnaissance, R-217, April 1951, p. 80.

[23] Rpt, RCA-RAND, Progress Report (Project Feed Back), RM-999, 1 January 1953; background of the Beacon Hill Study and related developments in 1951 is contained in Herbert F. York and G. Allen Greb, "Strategic Reconnaissance," Bulletin of the Atomic Scientists, April 1977, p. 34.

Aeronautical Labs, and Edward Purcell of Harvard University. These individuals concluded their deliberations in May and issued a final report in June 1952.

The Beacon Hill Report recommended to the Air Force specific improvements in the orientation, emphasis, and priority assigned to strategic intelligence, and solutions to the problems involved in its collection, reduction, and use. The study group also suggested refinements in sensors. The improved sensors, the group advised, could be flown near Soviet territory in advanced high-altitude aircraft, high-altitude balloons (later, WS 119L), sounding rockets, and in long-range drones such as the Snark or Navaho air-breathing missiles. Whatever the choice of vehicles, study group participants cautioned the service that actual "intrusion" over Soviet territory and violation of its national sovereignty required approval of political authorities "at the highest level." Space satellites, mentioned only in passing and then only as vehicles of the future in the grip of Newtonian mechanics, were however identified as certain intruders that would have to "overfly" the Soviet Union.[24]

Elsewhere around the country, various firms under contract to Rand were designing and evaluating specific satellite equipment, including a television payload (Radio Corporation of America), vehicle guidance and attitude-control devices (North American Aviation), and a nuclear auxiliary electrical power source (Westinghouse Electric Corporation, Bendix Aviation, Allis-Chalmers, and the Vitro Corporation). This effort, known collectively as Project Feed Back, confirmed that automated satellites could be built without exceptional delays and at an affordable cost. Whatever the legal ramifications of overflight in outer space might be, in September 1953 Rand officials recommended that a satellite be built,[25] and a few months later concluded their preliminary work and published a final report.

Issued on 1 March 1954, the Project Feed Back report described a military satellite for observation, mapping, and weather analysis, along with examples of the necessary space hardware and ground support systems. The second stage booster-satellite would be placed in a low-altitude, "sun synchronous" polar orbit inclined 83 degrees to the equator. Launched at the proper time of day at this inclination, the satellite would precess in one year through 360 degrees, allowing a

---

[24] Project Lincoln, Beacon Hill Report: Problems of Air Force Intelligence and Reconnaissance, Massachusetts Institute of Technology, Boston, MA: 15 June 1951, passim.

[25] Perry, Origins of the USAF Space Program, pp. 35, 39; and Merton E. Davies and William R. Harris, RAND's Role in the Evolution of Balloon and Satellite Observation Systems and Related U.S. Space Technology, (Santa Monica, CA: The RAND Corporation, R-3692-RC, 1988), p. 47.

television camera to operate in maximum daylight brightness throughout all seasons.[26] Rand engineers estimated this satellite system would produce "30 million pictures in one year of operation," a sum equivalent to all the pictures held in the USAF Photo Records and Services Division acquired from all sources in peace and war over the previous twenty-five years![27] Where the Air Force might find the photo-interpreters needed to evaluate this mountain of information, Rand did not say.

In early 1954, however, the problem that faced American policymakers was not too much intelligence information about the Soviet Union, but far too little. Attempts to fly around the USSR had thus far produced inadequate information; details of Soviet military preparations and capabilities remained as much an enigma as ever. Continued Soviet production of nuclear weapons and the means to deliver them, such as the Bison long-range bomber, combined in August 1953 with the Soviet detonation of a thermonuclear device. That particularly disturbed President Eisenhower. Former Supreme Commander of the Allied Expeditionary Force in Western Europe, he had helped engineer the destruction of the Axis powers in World War II and knew firsthand the enormous devastation that accompanied modern total war.

Any aerial surprise attack on the United States with nuclear weapons, even a limited one, could lay waste most of the metropolitan areas on the East and West coasts. Moreover, with government agencies unable to gauge the exact nature and extent of a Soviet military threat, the President found himself at a distinct disadvantage in selecting the appropriate level of military preparedness to combat it. This situation, Eisenhower made clear at a meeting of his National Security Council on 24 February 1954, had to be resolved--and soon. As a first step to counter a possible surprise attack, he had already approved a prior council recommendation to design and construct with Canadian approval a Distant Early Warning (DEW) picket line of radars across the North American Arctic, to detect and track any Soviet bombers that might be directed against the two countries.[28]

---

[26] James E. Lipp and Robert M. Salter, eds., Rpt, The RAND Corporation, Project Feed Back Summary Report, R-262, Vol I, 1 March 1954, pp. 109-110.

[27] *Ibid.*, pp. 85-86.

[28] Stephen E. Ambrose, Ike's Spies: Eisenhower and the Espionage Establishment. (Garden City, NY: Doubleday & Co., 1981), pp. 253, 267; Rpt, Aerospace Defense Command, A Chronology of Air Defense, 1914-1972, ADC Historical Study No. 19, March 1973, p. 33; see also, NSC 159/4 and attached statement of policy on "Continental Defense," 25 September 1953, and NSC 5408, "Report to the National Security Council by the National Security Planning Board," 11 February 1954, as reprinted in William Z. Slany, ed., Foreign Relations of the United States, 1952-1954, Volume II: National Security Affairs, Part 1. (USGPO, 1984), pp. 475-489, and 609-624.

Civilian scientists appointed to the Science Advisory Committee in the Office of Defense Mobilization, meanwhile, had been examining similar issues under the prodding of Trevor Gardner, the "technologically evangelical assistant secretary of the Air Force for research and development." Learning of these studies, the president's special assistant for security affairs, General Robert Cutler, invited key committee members to the White House. Meeting with them on 27 March 1954, Eisenhower discussed his concerns about a surprise attack on the United States and the prospects for avoiding or containing it. "Modern weapons," he warned, "had made it easier for a hostile nation with a closed society to plan an attack in secrecy and thus gain an advantage denied to the nation with an open society." In spite of the Oppenheimer case, he apparently viewed the scientists as honest brokers in a partisan city, and he challenged them to tackle this problem.[29]

They did. Lee A. DuBridge, president of the California Institute of Technology and chairman of the Science Advisory Committee, and James R. Killian, Jr., president of the Massachusetts Institute of Technology, formed a special task force to consider three areas of national security: continental defense, strike forces, and intelligence, with supporting studies in communications and technical manpower. Approved by President Eisenhower in the spring, the Surprise Attack Panel, or the Technological Capabilities Panel (TCP) as it was subsequently renamed, chaired by Killian, conducted its work between August 1954 and January 1955. Its membership included many of those who had produced the Beacon Hill Report and represented the best that American science and engineering offered. Its extraordinary report, Meeting the Threat of Surprise Attack, was issued on 14 February 1955; by all published accounts, the report affected the course of national security affairs enormously.[30]

The TCP report resulted in a number of significant alterations in American defense preparedness. Among other things, it recommended accelerating procurement of intercontinental ballistic missiles (Atlas, and later Titan and Minuteman ICBMs), constructing land- and sea-based intermediate-range ballistic missiles (later Thor, Jupiter, and Polaris IRBMs), and speeding construction of the DEW line in the Arctic (declared operational in August 1957). The TCP also

---

[29] The description of Gardner, and of Eisenhower as quoted, is in Killian, Sputnik, Scientists, and Eisenhower, p. 68; see also, Prados, The Soviet Estimate, p. 60.

[30] TCP Rpt, Meeting the Threat of Surprise Attack, Vol I and Vol II, 14 February 1955; see also Killian, Sputnik, Scientists, and Eisenhower, pp. 11-12, 70-82; Herbert F. York and G. Allen Greb, "Military Research and Development: A Postwar History," Bulletin of the Atomic Scientists, January 1977, p. 22; also, York and Greb, "Strategic Reconnaissance," p. 35. For the next two years, the deliberations of the National Security Council turned frequently to the findings and recommendations contained in this report. See John P. Glennon, ed., Foreign Relations of the United States, 1955-1957: Volume XIX, National Security Policy. (Washington, D.C.: USGPO, 1990), hereafter referred to as Volume XIX.

identified a time table of changes in the relative military and technical positions of the two super powers. Even more important, perhaps, were the recommendations to acquire and use strategic pre-hostilities intelligence. The intelligence panel, chaired by Edwin Land, urged construction and deployment of the U-2 aircraft[31] that could, if called upon, overfly the Soviet Union at very high altitudes.[32] In its section on intelligence applications of science, the report recommended beginning immediately a program to develop a small scientific satellite that would operate at extreme altitudes above national airspace, intended to establish the principle of "freedom of space" in international law for subsequent military satellites.[33] Although committee members could hope that scientific satellites might set such a precedent, James Killian, who chaired the TCP, viewed Rand's proposed military observation satellite as a "peripheral project" and would refuse it his active support until the Soviets launched Sputnik I nearly three years later.

Back in the summer of 1954, shortly after authorizing the surprise-attack study, President Eisenhower approved formation of an organization devoted exclusively to that subject: the National Indications Center. This center, chaired by the Deputy Director of Central Intelligence and composed of specialists drawn from U.S. intelligence agencies, and the Departments of Defense and State, formed the interagency staff of the National Watch Committee, which consisted of

---

[31] Indeed, Eisenhower approved development of the U-2 during the TCP deliberations on 24 November 1954, and assigned the project to the CIA instead of the Air Force. Under the guidance of Richard M. Bissell, Jr., CIA Special Assistant to the DCI, Colonel O. J. Ritland, USAF, and Clarence L. "Kelly" Johnson of the Lockheed Aircraft Corporation, the first U-2 was airborne within eight months, on 6 August 1955. Stephen Ambrose, Ike's Spies: Eisenhower and the Espionage Establishment. (Garden City, New York: Doubleday & Co., 1981), p. 268; and Leonard Mosley, Dulles: A Biography of Eleanor, Allen, and John Foster Dulles and Their Family Network. (New York: Dial Press, 1978), pp. 365-366.

[32] Dwight D. Eisenhower, Waging Peace, 1956-1961. (Garden City, NY: Doubleday & Co., Inc., 1965), p. 470; Killian, Sputnik, Scientists, and Eisenhower, pp. 71-84; Rpt, A Chronology of Air Defense, 1914-1972, p. 46. The cleared recommendations of the TCP are reprinted in Volume XIX, pp. 46-56. The U-2 program was appended to the two-volume TCP report as a classified annex, and is nowhere mentioned in the report itself.

Thoughout the 1950s Eisenhower withheld knowledge of the U-2's existence from all but those few directly involved. The program never appeared as an item in National Security Council deliberations until "it tore its britches" in 1960. Karl G. Harr, Jr., "Eisenhower's Approach to National Security Decision Making," in Kenneth W. Thompson, ed., The Eisenhower Presidency: Eleven Intimate Perspectives of Dwight D. Eisenhower. Vol 3 in Portraits of American Presidents. (Lanham, MD: University Press of America, 1984), p. 97. The product of the U-2 flights was even more closely held, and Eisenhower refused to refute political charges that an American "bomber gap" and, later, a "missile gap" existed, even though *he knew* them to be false. The latter issue, artfully exploited by John Kennedy, may well have cost Richard Nixon the 1960 presidential election. Since that time, to avoid an unwanted repetition, candidates selected in convention have been "briefed" on national security affairs before a presidential campaign begins.

All of these actions and events square with the perceptive thesis of Eisenhower governance elucidated by Fred I. Greenstein, The Hidden-Hand Presidency: Eisenhower as Leader. (NY: Basic Books, Inc., 1982).

[33] TCP Rpt, Meeting the Threat of Surprise Attack, Vol II, pp. 146-148.

presidential confidants such as the Secretaries of State and Defense, and the Director of Central Intelligence (DCI). Chartered on 1 July 1954 for the express purpose of "preventing strategic surprise," the center drew on information furnished by all national intelligence organizations. Eisenhower, one of the participants recalled vividly, was a man "boresighted on early warning of surprise attack."[34]

The National Indications Center assayed the military, economic, and social demands involved in mounting a surprise attack and issued a weekly "watch report" to the watch committee members. Staffers expanded an indications list of key indicators developed earlier under the direction of James J. Hitchcock in the CIA, and applied it to developments that would presage surprise attack in the nuclear age.[35] That is, presuming rational political leadership, one state intending to attack another would need to prepare carefully, say, by dispersing its industry and population many months in advance, and by deploying its military forces on land and sea just days or hours before "M-Day." Thus, the proper intelligence "indicators" applied against this matrix would yield readily identifiable signals, much like a traffic light: green--normal activity; amber--caution; red--warning.[36] These strategic warning indicators, eventually linked to "defense conditions" (DEFCON 5 through 1), enabled American leaders to mobilize resources and establish force readiness postures. The military, economic, and technical indicators listed in this matrix successfully predicted the Suez War in 1956, and have been monitored and reported in one form or another to

---

[34] Interview with James J. Hitchcock, 23 May 1986; Cynthia M. Grabo, "The Watch Committee and the National Indications Center: The Evolution of U.S. Strategic Warning, 1950-1975," International Journal of Intelligence and CounterIntelligence, Vol 3, No. 3, Fall 1989, pp. 369-370; see also, Eisenhower letter to Winston Churchill, cited in Killian, Sputnik, Scientists, and Eisenhower, p. 88. One has only to peruse the documents in Volume XIX to gain an appreciation for Eisenhower's fixation on surprise attack and his dedication to forestalling such an event. See especially [8] at p. 40.

[35] A Rand study doubtless figured in these deliberations and actions, though a direct linkage is not established at this time. One year earlier, three months after President Eisenhower's inauguration, Andrew W. Marshall and James F. Digby issued Rand Special Memorandum SM-14, The Military Value of Advanced Warning of Hostilities and its Implications for Intelligence Indicators, April 1953 (rev. July 1953). The authors compared intelligence warning of attack to the performance of military forces, and urged attention to short-term indications of Soviet preparations for surprise attack. Copies unquestionably circulated within intelligence circles, including the CIA.

[36] The British first developed an indicators list in 1948 to identify actions the Soviets would have to take to occupy Berlin. Hitchcock subsequently altered and expanded the list at the CIA in the late 1940s and early 1950s to identify actions that would warn of a surprise attack against the United States. The best available source in the open literature that describes related Rand activities in the 1940s and 1950s is Merton E. Davies and William R. Harris, RAND's Role in the Evolution of Balloon and Satellite Observation Systems and Related U.S. Space Technology. (The RAND Corporation, R-3692-RC, September 1988.)

or another to the president and other command authorities ever since. The National Indications Center itself, however, was dissolved in March 1975.[37]

Establishing National Space Policy, Organizing the Space Program

Dwight Eisenhower, to be sure, worried considerably about the danger of a Soviet surprise attack in the mid 1950s. And he judged strategic warning absolutely vital to counter or preclude it. In the spring of 1955, shortly after the TCP submitted its report that recommended a satellite program, the president's closest advisors determined, if at all possible, to keep outer space a region open to all, where the spacecraft of any state might overfly all states, a region free of military posturing. By adopting a policy that favored a legal regime for outer space analogous to that of the high seas, the United States might make possible the precedent "freedom of space" with all that that implied for overflight. This choice also favored non-aggressive, peaceful space flight operations, especially the launch of scientific Earth satellites to explore outer space that civilian scientists now urged as part of the US contribution to the International Geophysical Year (IGY).[38] This program, proposed by the United States National Committee for the IGY of the National Academy of Sciences in a report of 14 March 1955, had been approved by the academy and sent to National Science Foundation director Alan T. Waterman for government consideration.[39]

---

[37] Grabo, "The Watch Committee and the National Indications Center," p. 384; Volume XIX [19]; another survey of this subject in the open literature is Duncan E. MacDonald, "The Requirements for Information and Systems," in F. J. Ossenbeck and P. C. Kroeck, eds., Open Space and Peace: A Symposium on the Effects of Observation. (Stanford, CA: The Hoover Institution, 1964), pp. 64-83. The NSC Planning Board, also at the president's direction, in November 1954 had established a "net capabilities evaluation subcommittee" that performed a function similar to the National Indications Center for the council. See [1 and 19] in Volume XIX.

[38] In 1952 the International Council of Scientific Unions (ICSU) established a committee to arrange another International Polar Year to study geophysical phenomena in remote areas of the Earth. (Two previous polar years had been conducted, one in 1882-1883 and another in 1932-1933.) Late in 1952 the council expanded the scope of this effort, planned for 1957-1958, to include rocket research in the upper atmosphere and changed the name to the International Geophysical Year. In October 1954 the ICSU, meeting in Rome, Italy, adopted another resolution that called for launching scientific Earth satellites during the IGY. Cf., "Editorial Note," in John P. Glennon, ed., Foreign Relations of the United States, 1955-1957: Volume XI, United Nations and General International Matters. (Washington D.C.: USGPO, 1988), [361], pp. 784-785. [See Chapter V, "Space Science."]

[39] A few months earlier, in December 1954, the American Rocket Society's Committee on Space Flight completed a similar report on the utility of scientific Earth satellites, including a proposal by John Robinson Pierce of Bell Laboratories for a passive communication satellite that much resembled the later Project Echo, and submitted it to National Science Foundation director, Alan T. Waterman. By the spring of 1955 a number of Earth-satellite proposals had landed on the desks of officials at the National

By this time, a number of prominent scientists and military leaders actively sought approval for space-flight missions. A few months after Rand's Feed Back report appeared, the Air Force had acted on its recommendations. On 29 November 1954, Headquarters Air Research and Development Command issued System Requirement No. 5 that called for competitive system-design studies of a military satellite. On 16 March 1955, while the National Academy of Sciences was completing its satellite deliberations, Headquarters USAF issued General Operational Requirement No. 80 (SA-2c) that approved construction of and provided technical requirements for military observation satellites. At about the same time, the service named the observation satellite the WS 117L program. In April the Naval Research Laboratory submitted to the defense department a "Scientific Satellite Program" for the IGY, eventually known as Vanguard, which proposed using as a first-stage booster the Viking sounding rocket. Meanwhile, the Army's Redstone rocket team led by Major General John B. Medaris and Wernher von Braun had for some months urged a small, inert, Earth satellite launched with the Jupiter IRBM, called Project Orbiter (later named Explorer). These and other events soon to follow made 1955 the most momentous of years for the inchoate American space program.[40]

In May 1955, administration officials agreed that the country should launch scientific Earth satellites as a contribution to the IGY. Early in the month, Assistant Secretary of Defense for Research and Development Donald Quarles referred the Army and Navy satellite proposals to his Committee on Special Capabilities, and requested a scientific satellite proposal from the Air Force.[41] He instructed committee members to evaluate these proposals and recommend a preferred program. Quarles, who warmly embraced the satellite recommendations of Killian's Technological

---

Science Foundation and the defense department. See R. Cargill Hall, "Origins and Development of the Vanguard and Explorer Satellite Programs," Airpower Historian, Vol XI, No. 4, October 1964, pp. 106-108.

[40] *Ibid.*, pp. 102-104. Project Orbiter first appeared with the name A Minimum Satellite Vehicle, the result of a 3 August 1954 meeting between Army officials at the Redstone Arsenal and Navy representatives from the Office of Naval Research. See Wernher von Braun, "A Minimum Satellite Vehicle Based on Components Available from Missile Developments of the Army Ordnance Corps," Guided Missile Development Division, Ordnance Missile Laboratories, Redstone Arsenal, 15 September 1954.

[41] The Air Force proposal, called "World Series," featured an Atlas first stage and Aerobee-Hi second stage; it was submitted to the Committee on Special Capabilities (Stewart Committee) during the first week of July 1955. Because World Series conflicted with the WS 117L program, Air Force leaders gave it scant support.

Throughout the Eisenhower presidency until his death in office, Donald A. Quarles would influence greatly the choice of policy and missions for the civilian and military satellite programs, first as Assistant Secretary of Defense for Research and Development (September 1953-August 1955, cf., footnote 12, *supra*), then as Secretary of the Air Force (August 1955-April 1957), and finally as Deputy Secretary of Defense (April 1957-May 1959).

Capabilities Panel, subsequently drafted a policy for the launching of these and other spacecraft and submitted it on 20 May to the National Security Council. NSC members meeting on 26 May endorsed the Quarles' proposal and accompanying national policy guidance: a scientific satellite program for the IGY would not interfere with development of high-priority ICBM and IRBM weapons; emphasis would be placed on the peaceful purposes of the endeavor; the scientific satellites would help establish the principle in international law of "freedom of space" and the right of unimpeded overflight that went with it; and these IGY satellites would serve as technical precursors for subsequent American military satellites. "Considerable prestige and psychological benefits," the policy concluded, "will accrue to the nation which first is successful in launching a satellite."[42] The next day, "after sleeping on it," President Eisenhower approved this plan.[43]

With the president's decision, the United States had tentatively set out to prosecute two closely-associated space programs: instrumented military applications and civilian scientific satellites. If presidential advisors still perceived the more complex military spacecraft to be a long way off, the IGY scientific satellite program was clearly identified as a stalking horse to establish the precedent of overflight in space for the eventual operation of its military alternate. Charged with the WS 117L program, the Air Force earlier in 1955 had selected three firms to compete in a one-year design study of a preferred vehicle. But neither the military nor the scientific satellite program had as yet selected a contractor to conduct the work. And neither shared a national priority.

Out in Burbank, California, in Kelly Johnson's Lockheed "skunk works," the U-2 Project unquestionably claimed the highest of national priorities. With the first of these turbojet-powered gliders nearing completion, and with an operating ceiling anticipated in excess of 70,000 feet, Eisenhower learned that the United States could soon overfly parts of Soviet airspace at will.[44] No known jet fighter operated at altitudes above 50,000 feet. But however safe manned aerial

---

[42] National Security Council (NSC) 5520, "U.S. Scientific Satellite Program," 20 May 1955, p. 1-3. See also, Annex B, accompanying Memorandum from Nelson A. Rockefeller to Mr. James S. Lay, Jr., Executive Secretary, "U.S. Scientific Satellite Program," 17 May 1955. These documents reprinted, along with the NSC endorsement, in John P. Glennon, ed., Foreign Relations of the United States, 1955-1957: Volume XI, United Nations and General International Matters. (Washington D.C.: USGPO, 1988), [340/341], pp. 723-733, hereafter referred to as Volume XI. Air Force leaders enthusiastically embraced the dictum that IGY satellites would not interfer with the ICBM, IRBM, and military satellite programs; Perry, Origins of the USAF Space Program, pp. 43-44.

[43] Eisenhower quoted in Lee Bowen, An Air Force History of Space Activities, 1945-1959, (USAF Historical Division Liaison Office, August 1964), p. 64. Eisenhower did approve the IGY satellite program and related space policy in NSC 5520 the next day, on 27 May 1955; see Volume XI [341], p. 733.

[44] Ambrose, Ike's Spies, p. 271; Clarence "Kelly" Johnson, Interview with Morley Safer on CBS "60 Minutes," 17 October 1982; and Eisenhower, Waging Peace, pp. 544-545.

overflight might appear, and however attractive the chance to know more about Soviet military preparations, any unauthorized penetration of another state's airspace represented a certain violation of international law; a violation, that is, unless the leaders concerned agreed to such flights beforehand.

While a U-2 neared its first test flight in Nevada, on 21 July 1955 at a summit conference in Geneva, Eisenhower advised Soviet leaders of just such a plan. The president, in an unannounced addition to a disarmament proposal, directly addressed the subject that most concerned him. The absence of trust and the presence of "terrible weapons" among states, he asserted, provoked in the world "fears and dangers of surprise attack." To eliminate these fears, he urged that the Soviet Union and the United States provide "facilities for aerial photography to the other country" and conduct mutually supervised reconnaissance overflights.[45] Before the day ended, Chairman of the Soviet Council of Ministers Nikolai Bulganin, and First Secretary of the Communist Party Nikita Khrushchev, privately rejected the President's plan, known eventually as the "Open Skies" doctrine, as an obvious American attempt to "accumulate target information." "We knew the Soviets wouldn't accept it," Eisenhower later confided in an interview, "but we took a look and thought it was a good move."[46] Though the Soviets might object, they were forewarned.[47] Eleven months later, some five months after he terminated the balloon reconnaissance program, Eisenhower would approve the first U-2 overflight of the USSR.[48]

---

[45] "Statement on Disarmament, July 21," The Department of State Bulletin, Vol XXXIII, No. 841, 1 August 1955, p. 174; Elie Abel, "Eisenhower Calls Upon Soviet Union to Exchange Arms Blueprints," New York Times, 22 July 1955, p. 1; also Prados, The Soviet Estimate, pp. 31-32. The term "Open Skies" was coined later by the popular press and applied to Eisenhower's statement on disarmament. The background of this proposal, as advanced by the president's special assistant, Harold Stassen and debated in the National Security Council, is contained in John P. Glennon, ed., Foreign Relations of the United States, 1955-1957: Volume XX, Regulation of Armaments; Atomic Energy. (Washington, D.C.: USGPO, 1990), see especially [33 through 48]. By 1956-1957, Eisenhower and other key administration leaders would view aerial reconnaissance as an "inspection system" that could serve two critical functions: to forewarn of surprise attack *and* supervise and verify arms-reduction and nuclear-test-ban agreements. Volume XX, *passim*.

[46] Herbert S. Parmet, Eisenhower and the American Crusades. (New York: The MacMillan Company, 1972), p. 406; see also, W. W. Rostow, Open Skies, pp. 7-8.

[47] Richard Leghorn, then working for Eisenhower's special assistant Harold Stassen, wrote the paper on which the "Open Skies" doctrine was predicated. He also produced the thirty-two-page booklet explaining this disarmament proposal given to those attending the Big Four Geneva Conference. Cf., Richard S. Leghorn, "U.S. Can Photograph Russia from the Air Now," U.S. News & World Report, 5 August 1955, pp. 70-75; and "Editor's Note" at p. 71. Cleared by the White House, this important article explained the administration's rationale for Open Skies and the implications of this plan for arms reduction.

[48] Ambrose, Ike's Spies, p. 266, pp. 31-34.

Back in the United States, on 27 July 1955 Eisenhower met with National Science Foundation director Waterman, Assistant Secretary of Defense Quarles, and Undersecretary of State Herbert Hoover, Jr., to discuss how best to make known the existence of an American IGY

Figure 1

Donald A. Quarles (on right) sworn in as Secretary of the Air Force by Secretary of the Army Wilber M. Brucker, 15 August 1955. Secretary of Defense Charles E. Wilson (center) looks on.

satellite program. A general statement, it was decided, would come from the White House after Congressional leaders had been notified, with scientific details provided by scientific groups. These statements would emphasize the satellite project "as a contribution benefiting science throughout the world," and would not link it in any way "to military missile development." Two days later, on 29 July, the president publicly announced plans for launching "small unmanned, Earth circling satellites as part of the U.S. participation in the International Geophysical Year" scheduled between

July 1957 and December 1958. His statement avoided any hint at the underlying purpose of the enterprise, and assigned to the National Science Foundation responsibility for directing the project, with "logistic and technical support" to be furnished by the Department of Defense. In that department a few weeks afterward, Quarles' Committee on Special Capabilities selected for the IGY satellite project the Naval Research Laboratory's Vanguard proposal, one that combined modified Viking and Aerobee-Hi sounding rockets for the scientific satellite booster, and named the U.S. Navy manager for logistics and technical support.[49]

Within a year, in June 1956, the Air Force chose Lockheed's Missile Systems Division in Sunnyvale, California, to design and build the military satellites for the WS 117L program. Lockheed's winning proposal featured a large, second-stage, booster satellite that in orbit could be stabilized on three axes with a high pointing accuracy. To become known as "Agena," this vehicle would be designed and tested to meet Air Force plans for an operational capability in the third quarter of 1963. If the diminutive Vanguard scientific satellite was projected to weigh tens of pounds and be launched by a modified sounding rocket, the proposed Air Force satellite would weigh thousands of pounds and be launched atop an Atlas ICBM.[50]

Among other payloads, Lockheed recommended for development those already identified by the Navy and Rand, and added one of its own: an infrared radiometer and telescope to detect the hot exhaust gases emitted by long-range jet bombers and, more important, large rockets as they ascended under power through the atmosphere. This novel aircraft-tracker and missile-detection innovation advanced by Joseph J. Knopow, a young Lockheed engineer, fit nicely into the strategic warning efforts of the day and unquestionably helped tip the scales in Lockheed's favor.[51] The Air Force awarded the firm a contract for this program a few months later, in October 1956.[52]

---

[49] Attendees at the 27 July meeting included Eisenhower's staff secretary and defense liaison, Colonel Andrew Goodpaster, USA. Goodpaster, "Memorandum of Conference with the President, July 27, 1955, 11:45 AM." The news release is reprinted in Volume XX [342], p. 734; see also for related events and the Quarles' IGY selection process, Constance McL. Green and Milton Lomask, Vanguard: A History, (Washington D.C.: USGPO, NASA SP-4202, 1970), pp. 37-38, 55-56, and *passim*.

[50] In the mid 1950s, Convair's James W. Crooks, Jr., constantly reminded audiences at Wright-Patterson AFB and elsewhere that the Atlas could lift the weight of a new Chevrolet, 3,500 lbs., into low Earth orbit. As events turned out, Atlas with a powered upper stage could lift a good deal more--about 10,000 lbs. into low Earth orbit.

[51] In time, this payload proposal would be separated and identified as the Missile Detection and Alarm System (MIDAS), then evolve to become the contemporary Defense Support Program (DSP). Today, this remarkable set of military satellites can detect and provide advance warning of a rocket attack within moments of its launch at sea or on land.

[52] Rpt, LMSD 1536, Pied Piper Development Plan, Vol II, 1 March 1956, Subsystem Plan, A. Airframe, A-Apdx, pp. 3-4; and Vol I, System Plan, *passim*.

Figure 2

Scientists receive USAF Exceptional Service Award. Left to right: Air Force Secretary Donald Quarles; Harry Wexler, US Weather Bureau; George E. Valley, Jr., Lincoln Laboratories, MIT; Gen Nathan F. Twining, Chief of Staff, USAF; Lt Gen Donald Putt, Deputy Chief of Staff, Research and Development; and retired Lt Gen James H. Doolittle; 30 November 1956.

Thus, a year before Sputnik, the two modest United States space programs moved ahead slowly, staying within strict funding prescriptions and avoiding unwanted interference with development of the nation's long-range ballistic missiles just underway. They shared a lower priority than other high-technology defense department programs, and, to avoid provoking an international debate over "freedom of space," Eisenhower administration leaders in 1956 restrained government officials from any public discussion of space flight.[53] At the Pentagon, after a WS 117L program

[53] Unwitting of the National Security Council deliberations and of the ground rules established for the nation's space program, contemporary American military leaders failed entirely to comprehend the rationale that prompted this restriction on public discussion. See, for example, Maj Gen John B. Medaris, USA, with Arthur Gordon, Countdown for Decision. (New York: Paperback Library, Inc., 1960), pp. 101, 124; and testimony of Lt Gen James M. Gavin, Deputy Chief of Staff Research and Development, USA, in U.S. Senate, Inquiry into Satellite and Missile Programs, "Hearings before the Senate Preparedness Investigating Subcommittee of the Committee on Armed Services," Part II, 6 January 1958, p. 1474, and

briefing on 17 November, Donald Quarles, now Secretary of the Air Force, instructed Lieutenant General Donald Putt, Deputy Chief of Staff for Research and Development, to cease all efforts toward vehicle construction. He expressly forbade fabrication of a mockup or of the first satellite without his personal permission. A military satellite, the Air Force learned, would under no circumstances precede a scientific satellite into orbit.[54]

If in early 1957 President Eisenhower remained undecided whether the United States need launch any more than six satellites for science, Secretary of Defense Charles Wilson remained unimpressed with expensive astronautical ventures of any kind. "A 'damn orange' up in the air," he snapped to confidants. In May, as costs to build and launch the original six IGY vehicles soared from an estimated $20 million to $100 million, he told Eisenhower that Earth satellites, whatever their merit, "had too many promoters and no bankers."[55] Donald Quarles, named Deputy Secretary of Defense one month earlier, nonetheless supported the US IGY satellite effort while he kept an eye on related developments in the USSR. At his request near the end of June, CIA director Allen Dulles assayed recent Soviet hints of an impending satellite launch. "The U.S. [intelligence] community," Dulles advised, "estimates that for prestige and psychological factors, the USSR would endeavor to be first in launching an earth satellite." Moreover, said he, it "probably is capable of

---

Part I, 13 December 1957, p. 509. Air Force General Bernard Schriever, charged with the missile and space efforts of that service in the mid-to-late 1950s, was still fuming in 1985. In a February 1957 speech he recalled announcing that the Air Force was ready to "move forward rapidly into space. I received instructions *the next day* from the Pentagon that I shouldn't use the word 'space' in any of my future speeches. Now that was February 1957! They [the administration] had the IGY going you know, which was kind of a scientific boondoggle." Richard H. Kohn, June 1985 interview with generals Doolittle, Schriever, Phillips, Marsh, and Dr. Getting, in J. Neufeld, ed., USAF Research and Development, (Washington DC: Office of Air Force History), 1990, p. 105.

Regarding priority, GOR No. 80 of 16 March 1955 specified a date of "operational availability" for the military satellites in the mid 1960s, a date that bespoke a low priority and bracketed this system to follow the U-2. Certainly, the first military space flights would trail by many months those of the scientific satellites. IGY space program priorities considered in "Memorandum of Discussion at the 283d Meeting of the National Security Council, Washington, May 3, 1956," in Volume XI [343], pp. 740-741.

[54] USAF Space Programs, 1945-1962, Volume 1, USAF Historical Division Liaison Office, October 1962, p. 18. The historian added: " . . . it was apparent that the possible political repercussions arising from use of a military space vehicle were causing concern." On the west coast, General Schriever complained vigorously. The next year, in 1957, he declared, "I finally got $10 million [for WS 117L] from Don Quarles, who was Secretary of the Air Force, with instructions that we could not use that money in any way except component development. No systems work whatsoever. $10 million!" Schriever comments in USAF Research and Development, pp. 105-106. The Quarles' stricture remained in effect for nearly an entire year and was not lifted until September 1957.

[55] Wilson as quoted by Karl Harr, "Eisenhower's Approach to National Security Decision Making," p. 96, and as quoted in "Memorandum of Discussion at the 322d Meeting of the National Security Council, Washington, May 10, 1957," in Volume XI [345], p. 752.

launching a satellite in 1957 . . . ."[56] However accurate the CIA assessment might be, advocates of the WS 117L still could not obtain any active support for their military space venture in the defense department. Indeed, in July, Quarles imposed sharp spending limits on the Air Force satellite program, effectively confining that work to the "study level."

Figure 3

In the Pentagon, early 1957. Left to right, Secretary of the Air Force Donald A. Quarles; Chief of Staff, Gen Nathan F. Twining; and Vice Chief of Staff, Gen Thomas D. White.

This state of affairs changed dramatically a few months later, in October-November 1957, after the USSR launched Sputniks I and II. Despite presidential assurances,[57] the Soviet space

---

[56] Letter, Allen W. Dulles, Director, Central Intelligence Agency, to Donald A. Quarles, Deputy Secretary of Defense, 5 July 1957.

[57] In his first news conference after the launch of Sputnik I on 9 October 1957, President Eisenhower let slip his true interest in the event, though it went unnoticed in the excitement of the day. "From what they say they have put one small ball in the air," the President declared, adding, "at this moment you [don't] have to fear the intelligence aspects of this." Public Papers of the President of the United States: Dwight David Eisenhower, 1957. (Washington D.C.: USGPO, 1958 [210]), p. 724.

accomplishments fueled a national debate over US defense and science policies. Having downplayed the space program for purposes of their own, Eisenhower and his advisors underestimated the psychological shock value of satellites that Rand had identified, the TCP had acknowledged, and the National Security Council had underscored just a few years before. What began as an evenly- if slowly-paced research and development effort was to be spurred into a gallop.[58]

The sputniks, with their "Pearl Harbor" effect on public opinion, introduced into space affairs the issues of national pride and international prestige. The administration now moved quickly to restore confidence at home and prestige abroad. In short order the defense department authorized the Army to launch a scientific satellite as a backup to the National Science Foundation-Navy Vanguard Project, and the president created the Advanced Research Projects Agency (ARPA), assigning to it temporary responsibility for directing all US space projects. James Killian, recently named Science Advisor to the president, also changed his mind. More funds were made available to the military space program, and in early 1958 the administration approved launching these satellites sooner with Thor IRBM boosters. Finally, hoping to steal a march on the Soviets, Secretary of Defense Neil McElroy, who succeeded Charles Wilson in sputnik's aftermath, ordered ARPA to launch space vehicles to "provide a close look at the moon."[59]

The popular demand to get on as rapidly as possible with the exploration and use of outer space was undeniable. To guide this activity, Eisenhower declared on 2 April 1958, a unified national space agency had to be established.[60] Few disagreed, certainly not the American scientists who had begun to seriously consider the future of research in space, the prospects for obtaining

---

[58] Eisenhower's advisors had anticipated the launch of a Soviet satellite before the United States, and the Operations Coordinating Board, established within the structure of the National Security Council by Executive Order 10700, 25 February 1957, had prepared a contingency statement to be handled by the National Academy of Sciences. See Operations Coordinating Board, Memorandum of Meeting: Working Group on Certain Aspects of NSC 5520 (Earth Satellite), Fourth Meeting held 3:30 P.M., June 17, 1957, Room 357 Executive Office Building, and attachment: "Contingency Statement; Proposed Statement by Dr. Detlev W. Bronk, President of the National Academy of Sciences, in the Event the U.S.S.R. Announces Plans for or the Actual Launching of an Earth Satellite." Cf., also, Herbert F. York, Race to Oblivion. (New York: Simon and Schuster, Clarion Book, 1970), pp. 106, 146.

[59] Defense secretary Wilson had announced plans to resign before the launch of Sputnik I. These actions and events are described in National Security Council (NSC) Action No. 1846, 22 January 1958, as cited in NSC 5814/1, "Preliminary U.S. Policy on Outer Space," 18 August 1958, p. 20; Leonard Mosely, Dulles: A Biography of Eleanor, Allen, and John Foster Dulles and Their Family Network. (New York: The Dial Press, 1978), p. 432; Prados, The Soviet Estimate, pp. 106-107; DOD News Release No. 288-58, 27 March 1958; and ARPA Orders No. 1-58 and 2-58, 27 March 1958. The new satellite project is described by Kistiakowsky in A Scientist at the White House, p. 378.

[60] Robert Vexler (ed.), Dwight D. Eisenhower, 1880-1969, Chronology, Documents, Bibliographical Aids. (Dobbs Ferry, NY: Oceana Publications, Inc., 1972), p. 42.

more federal funds for this activity, and the ways of organizing it within the government that met their expectations of scientific independence, integrity, and excellence. During the subsequent dialog and in legislative action, the nation's political leaders endorsed the president's choice of civilian control of expanded US space activities. Except for national defense space operations, for which the Department of Defense remained responsible, the National Aeronautics and Space Act declared that all non-military aeronautical and space endeavors sponsored by the United States would be directed by a civilian agency guided by eight objectives. First among them was basic scientific research, defined as "the expansion of human knowledge of phenomena in the atmosphere and space . . . ." Signed into law by President Eisenhower on 29 July, the act wrote a broad and comprehensive mandate for the peaceful pursuit of new knowledge and accompanying technology in space.[61]

The National Aeronautics and Space Administration (NASA), formed with the National Advisory Committee for Aeronautics as its nucleus, began operating on 1 October 1958 with the ongoing scientific satellite and planetary exploration projects inherited from the National Science Foundation and ARPA. Air Force and other service leaders, limited exclusively to approved military spacefaring, still had to translate existing plans into functioning systems. Those instrumented military satellite projects already underway and projected at the end of 1958 formed the basic military space program.[62] It encompassed five functional areas, and, with one exception, consisted of unmanned military space flight projects. The program plan appears in Table 1.[63] Though in years to come the Air Force would for the most part retain responsibility for technically managing and launching military spacecraft, development and operational direction of the individual

---

[61] National Aeronautics and Space Act of 1958, Sec. 102(a) and 102(c); Frank W. Anderson, Jr., Orders of Magnitude: A History of NACA and NASA, 1915-1980. (Washington, D.C.: USGPO, NASA SP-4403, 1981), p. 17; Maier, in Kistiakowsky, A Scientist at the White House, pp. xxxviii-xxxxix. An elucidation of the reasons for and objectives of using and exploring space are contained in a contemporary brochure issued by the President's Science Advisory Committee, "A Statement by the President and Introduction to Outer Space," 26 March 1958.

[62] Various Air Force officials, it is true, attempting to gain responsibility for directing the nation's space program in 1958, did graft to this basic plan and present to Congress all sorts of exotic space proposals including manned and unmanned orbital bombardment systems, and even lunar military bases from which to attack countries on Earth. Besides flying in the face of stated administration commitments to explore and use outer space for peaceful and defensive purposes only, these proposals gained few adherents other than those who already viewed the Soviet sputniks with unalloyed hysteria.

[63] This program plan, it is also true, does not appear in this form in contemporary documents. The proposed manned rocket bomber (ROBO), later called Dyna-Soar (X-20), remained the sole exception to space robotics and in research and development until cancelled in the early 1960s (cf., note 70, *infra*). Notwithstanding the variations that marked it afterward, the 1958 plan featured automated spacecraft and reflects the basic American military space program in effect today.

Table 1

MILITARY SPACE PROGRAM PLAN, NOVEMBER 1958

Functions	*Projects*
Navigation	Transit navigation satellite system; assigned to the Navy on 9 May 1960
Meteorology	Tiros television (RCA) satellite system assigned to NASA; military system proposed, but held to studies while negotiations for a single civil-military system were underway with NASA and the Department of Commerce (Weather Bureau)
Communication	Courier active (repeater) strategic and tactical communication satellite system; assigned to the Army on 15 September 1960
Missile Detection and Space Defense	Infrared radiometers that detect focused heat sources (Missile Detection and Alarm--MIDAS)
	Satellite inspector
	ROBO/Dyna-Soar (X-20)
	Radar tracking of Earth satellites (SPASUR/SPADATS)
	Optical tracking of satellites (from IGY Baker-Nunn system)
	Distant Early Warning (DEW) radar net and, by the early 1960s, the Ballistic Missile Early Warning System (BMEWS) radar net
Observation of the Earth	Other automated satellites

projects frequently would be assigned elsewhere.[64]

Making Straight the Way

When NASA opened for business in October 1958, periodic U-2 flights over limited areas of the USSR had been underway for two years. The Soviets protested vigorously, albeit privately through diplomatic channels, and administration leaders knew now that improved ground-to-air missiles would soon preclude all such missions.[65] Late in the year, President Eisenhower officially notified the Russians once again that the United States specifically sought to allay fears of surprise attack and create an inspection system to supervise arms-reduction agreements by means of aerial *and* space observation. He did so by submitting a third, much more significant Open Skies proposal at an extraordinary "Surprise Attack Conference" sponsored by the United Nations in Geneva.[66]

Making his proposal the more remarkable, Eisenhower authorized his representatives William C. Foster, later head of the Arms Control and Disarmament Agency, and Harvard chemist George Kistiakowsky, to include a "sanitized" version of the threat-and-warning portions of the surprise-attack indications matrix supplied by the National Indications Center. He thus furnished Soviet officials key indicators with which to assay the military status of states in the North Atlantic Treaty Organization--if they had not already devised similar warning indicators independently. The Soviets once again rejected Open Skies, though U.S. commitments and intentions on this issue were here, most emphatically, made plain.[67] But even if the Soviets continued to reject the concept in

---

[64] Neil McElroy, Secretary of Defense, Memorandum to Chairman of the Joint Chiefs of Staff, "Responsibility for Space Systems," 18 September 1959, in Alice C. Cole, *et. al.*, eds., The Department of Defense: Documents on Establishment and Organization. (Washington D.C.: OSD, 1978), p. 325; also, DOD Directive No. 5160.32, "Development of Space Systems," 6 March 1961, as reprinted in *Ibid.*

[65] Eisenhower himself viewed these overflights in Soviet airspace as exceptionally provocative and a grave violation of national sovereignty; before personally approving each mission, he had to be convinced of the overriding need for it.

[66] The second proposal Eisenhower submitted directly to Nikolai A. Bulganin, Chairman of the Soviet Council of Ministers, on 2 March 1956, eight months after the original proposal in Geneva. In it, Eisenhower agreed to accept on-site inspection teams if the Soviet would accept Open Skies. It, too, was rejected. See Stephen E. Ambrose, Eisenhower: Volume II, The President (New York: Simon and Schuster, 1984), p. 311.

[67] Annex 5 and Annex 6 of "Report of the Conference of Experts for the Study of Possible Measures Which Might be Helpful in Preventing Surprise Attack and for the Preparation of a Report Thereon to Government," United Nations General Assembly, A/4078, S/4145, 5 January 1959; and William C. Foster, "Official Report of the United States Delegation to the Conference of Experts for the Study of Possible Measures Which Might be Helpful in Preventing Surprise Attack and for the Preparation of a Report Thereon to Governments," Geneva, Switzerland, 10 November - 18 December 1958, p. 10.

international conference, might not the precepts of international law now be applied to achieve it?

One year earlier, Soviet Sputniks I and II had overflown international boundaries without provoking diplomatic protests. Four days after Sputnik I, in fact, Eisenhower and Deputy Secretary of Defense Donald Quarles discussed this very issue. Quarles observed: ". . . the Russians have . . . done us a good turn, unintentionally, in establishing the concept of freedom of international space . . . . The President then looked ahead . . . and asked about a reconnaissance [satellite] vehicle."[68] The American IGY Explorer and Vanguard satellites that followed the first sputniks into orbit in early 1958 likewise transited the world, and again not a single state objected to these overflights. The civil spacecraft made straight the way of overflight for their military counterparts. This tenuous "freedom of space" principle, the evidence indicates, President Eisenhower in 1958 purposely sought to exploit and codify when he signed the space act. That signature formally divided American astronautics between civilian science and military applications directed to "peaceful," that is, scientific, or defensive and nonaggressive purposes.

Figure 4

Official Portrait
The Honorable Donald A. Quarles.

With the launch of military satellites near-at-hand, President Eisenhower amplified his space

---

[68] Quarles and Eisenhower remarks quoted in Walter A. McDougall, The Heavens and the Earth: A Political History of the Space Age. (New York: Basic Books, Inc., 1985), p. 134; an abridged version, less the reference to military satellites, appears in "Memorandum of a Conference, President's Office, White House, Washington, October 8, 1957, 8:30 a.m.," Volume XI [347], pp. 755-756. Walter McDougall and Stephen Ambrose, without access to classified documents, correctly perceived the intent of Eisenhower's satellite decision and the rationale behind it. Cf., McDougall, The Heavens and the Earth, Chapter 5; and Ambrose, Eisenhower, Volume II, pp. 428, 513-514. Quarles, architect of the nation's space policy, reiterated for administration leaders the importance of the principle "freedom of space" and its implications for military observation satellites at a meeting of the National Security Council on 10 October 1957, in Volume XI [348], p. 759.

policy with National Security Council directives in June and August 1958, and December 1959. Building on the Quarles'-formulated elementary policy of 1955, the first directive called for a "political framework which will place the uses of U.S. reconnaissance satellites in a political and psychological context most favorable to the United States." The second directive judged these spacecraft to be of "critical importance to U.S. national security," identified them with the peaceful uses of outer space, and set as an objective the "'opening up' of the Soviet Bloc through improved intelligence and programs of scientific cooperation." The third directive described the military support missions in space that fell within the rubric of peaceful uses, identified offensive space-weapon systems for study, and noted a positive political milestone in international law: The United Nations *Ad Hoc* Committee on the Peaceful Uses of Outer Space now accepted the "'permissibility of the launching and flight of space vehicles . . . regardless of what territory they passed over during the course of their flight through outer space.'" But the UN Committee, the directive confided, at the same time stipulated that this principle obtained only to flights involved in the "'peaceful uses of outer space.'"[69]

Hewing to the policy of "freedom of space" and the peaceful space activities they defined for it, Eisenhower administration officials would in the months ahead permit only the study of offensive space weapons such as space-based antiballistic missile systems, satellite interceptors, and manned orbital bombers that could threaten the precedent of free passage.[70] This space policy,

---

[69] NSC 5814, "U.S. Policy on Outer Space," 20 June 1958, paragraph 54; NSC 5814/1, "Preliminary U.S. Policy on Outer Space," 13 August 1958, paragraphs 21, 30, and 47; and NSC 5918, "U.S. Policy on Outer Space," 17 December 1959, paragraphs 18, 19, and 23.

[70] The administration's rationale in opposing anything more than the study of space-based weapons is explained in Kistiakowsky, A Scientist at the White House, at pp. 229-230, 239-240, and 245-246. A few days after the launch of Sputnik I, having just discussed this rationale with Eisenhower, Deputy Secretary of Defense Quarles surprised and chagrined Air Force leaders who briefed him on the military satellite program and the potential of satellites for offensive applications: ". . . Mr Quarles took very strong and specific exception to the inclusion in the presentation of any thoughts on the use of a satellite as a (nuclear) weapons carrier and stated that the Air Force was out of line in advancing this as a possible application of the satellite. He verbally directed that any such applications not be considered further in Air Force planning. Although both General [Curtis] LeMay and General [Donald] Putt voiced objection to this . . . on the grounds that we had no assurance that the USSR would not explore this potential of satellites and could be expected to do so, Mr. Quarles remained adamant." (Colonel F. C. E. Oder, USAF, Director, WS 117L, Memorandum for the Record, "Briefing of Deputy Secretary of Defense Mr. Quarles on WS 117L on 16 October 1957," 25 October 1957.)

Amplifying administration policy a year later, on 20 October 1958, ARPA Director Roy Johnson ordered the Air Force to cease using the Weapon System (WS) designation in the military satellite program "to minimize the aggressive international implications of overflight . . . . It is desired to emphasize the defensive, surprise-prevention aspects of the system. This change . . . should reduce the effectiveness of possible diplomatic protest against peacetime employment." (Ltr, Roy Johnson, Director, ARPA, to Maj General Bernard Schriever, Cmdr, Air Force Ballistic Missile Division, Air Research and Development Command, n.s., 20 October 1958.) Despite these and subsequent messages that cancelled offensive space-based, weapon-research programs, Air Force military leaders at that time seemed unable

endorsed by President Eisenhower's successor, John F. Kennedy, secured two objectives simultaneously and permitted the launch and operation of military reconnaissance spacecraft: first, it reinforced the "sputnik precedent" as an accepted principle among states, officially recognizing free access to and unimpeded passage through outer space for peaceful purposes. Second, by limiting military spacefaring to defense-support functions, it avoided a direct confrontation with the Soviet Union over observation of the Earth from space and ensured at least an opportunity to achieve Open Skies at altitudes above the territorial airspace of nation states. Thus, without formal convention, the United States could fashion unilaterally an "inspection system" to forewarn of surprise attack and supervise and verify future arms-reduction and nuclear-test-ban treaties.

But if the IGY scientific satellites had set an international precedent, at the end of 1958 the actual launch and operation of military spacecraft had still to test President Eisenhower's policy--and Soviet reaction.

---

to grasp--or unwilling to accept--the meaning of President Eisenhower's "peaceful uses of outer space," or the rationale behind it. Cf., note 53, *supra*.