

~~TOP SECRET//SI//TK//NOFORN//25X1~~

(U) The NRO, the Air Force, and the First Reconnaissance Relay Satellite System, 1969-1983¹

Vance O. Mitchell, Ph.D.

~~(S//TK//REL TO USA, AUS, GBR)~~ Without its relay satellite system, eventually called [] the NRO could not have established a near-real-time reconnaissance capability in the 1970s. This achievement was far from certain; [] success hinged on the NRO's ability to solve complex technological problems and contentious programmatic disputes. The NRO overcame management and technical disagreements between the program's staffs in the US Air Force and the NRO's Program B in their development of the [] relay satellites.² Despite continual disputes over payloads and management responsibilities, the NRO developed and launched the relay satellites on schedule, establishing the communications link for transferring electronic data to the ground stations that enabled near-real-time imagery retrieval from its Kennen [] electro-optical imaging (EOI) satellite.

(b)(1)
(b)(3)

~~(S//TK//REL TO USA, AUS, GBR)~~ Undeniably a resounding technological success, [] also demonstrated how organizations supporting the NRO could effectively collaborate even when both maintained somewhat dissimilar objectives and sought different benefits. The NRO's coordination of development activities, which included funding and overseeing programmatic operations through the publicly acknowledged Air Force while concealing the actual mission of the satellite payloads within the compartmented channels of the National Reconnaissance Program (NRP), facilitated a technologically challenging development.

(b)(1)
(b)(3)

~~(S//TK)~~ The first operational photoreconnaissance satellites — Corona, Gambit, and Hexagon — were film-based systems that returned their payloads to earth for processing and exploitation. All three were highly successful and within a few years had revolutionized photographic reconnaissance, yet they shared a serious weakness. Film return systems could not provide imagery data in near real time. The film canisters parachuted into the recovery area near Hawaii only after all the film had been exposed. The Air Force recovered the film and transported it to a processing center. When the film had been processed, the Air Force shipped it to exploitation facilities for analysis. That made the returned images anywhere from a few days to a few weeks old before they

¹ ~~(S//TK//REL TO USA, AUS, GBR)~~ Dr. Mitchell extracted this article from his manuscript, *The History of the* [] to be published by the Center for the Study of National Reconnaissance (CSNR).

² (U) Program B was the Central Intelligence Agency's (CIA) component of the NRO. Within the CIA, Program B was part of the Office of Development and Engineering (OD&E) in the Directorate of Science and Technology (DS&T).

(b)(1)
(b)(3)

~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

could be exploited. That was acceptable from a strategic intelligence perspective, but not for tactical purposes. An often-cited example of this deficiency happened during the 1968 invasion of Czechoslovakia. An orbiting Corona satellite deorbited its first film canister a few days too early to detect the pre-invasion buildup of Warsaw Forces; the film in the second canister captured the buildup but returned after the invasion. Clearly, the Intelligence Community needed a more responsive system. Fortunately, work on such a system had been ongoing for a number of years.

~~(S//TK)~~ During President Eisenhower's second term in office, the Air Force began work on a film-based photographic reconnaissance satellite capable of electronically transmitting images to a terrestrial ground station. The program, known as Project Samos, developed the exposed film onboard the satellite and scanned the negatives to produce electronic imaging data. In 1961 Samos proved that electronic return was possible when one of its orbiting satellites transmitted a few pictures to its terrestrial ground station before equipment failure terminated the mission. On the debit side, the images had a ground resolution of no better than 100 feet, making them of little use for intelligence purposes, and the overall system had so little potential for improvement that NRO Director Joseph Charyk cancelled the program.

~~(S//TK)~~ In 1963, the CIA, in its role as NRO Program B, undertook a more ambitious effort that would ultimately lead to the world's first electro-optical imaging satellite system. Initially known as Project Zoster, it became Project Zaman in 1966. Virtually all the time and money invested in the early years went into the imaging satellites, mostly identifying and perfecting sensors to record terrestrial features. Only in 1968 did the CIA's Leslie Dirks, [REDACTED] had responsibility for Zaman, choose relay satellites — rather than storing imaging data for later transmission to a terrestrial ground station — as the means of image return.³ Relays were, in fact, the only means of returning data in near real time, a standard vital to gaining support for Zaman.

(b)(1)
(b)(3)

~~(TS//TK)~~ The NRO began serious planning for relay satellites in 1969; in June, for the first time relay satellites became a separate line item in its budget. The line item funding for the relays came to only about [REDACTED] but it at least gave the program a separate identity and dedicated money to draw on. In that same month, Zaman representatives met with NRO Director John L. McLucas to discuss a long-range schedule that included relay satellites. The relay program would begin in the spring of 1970 when a preliminary evaluation would select a small number of civilian firms (no more than three) for a year-long System Definition Phase, set to begin in July of that year. Selection of a single firm for system acquisition would follow in October 1971. Consultants estimated that it would take [REDACTED] over a four-year period beginning with FY 1971 to adequately fund

(b)(1)
(b)(3)

(b)(1)
(b)(3)

³ (U) In addition to founding the DS&T's Office of Development and Engineering (OD&E), Leslie C. Dirks served from 1976 to 1982 as the CIA's Deputy Director of Science and Technology (DDS&T), in which role he led NRO Program B.

~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

research, development, and procurement of the first [] satellites. That turned out to be a rather large underestimation; [] (NRO, 1969a; NRO, 1969b; NRO, 1969c; NRO, n.d. a; NRO, 1969d; NRO, 1969e; NRO, 1969f).

(b)(1)

(b)(3)

(U) The Air Force Takes on Relay Development

~~(TS//TK)~~ Then, on 15 August 1969, the Executive Committee of the National Reconnaissance Program (ExCom) consigned relay satellite development to the Space and Missile Systems Office (SAMSO), a part of the Air Force Systems Command not affiliated with NRO's Program A, located at Los Angeles Air Force Station, California. The SAMSO would manage the program as an overt Air Force program ostensibly intended for purposes other than satellite reconnaissance. The NRO's Program B was involved and would exercise overall direction, but day-to-day management would rest with SAMSO. The Office of the Secretary of the Air Force would be the overt customer for the resulting satellites and serve as the funding conduit. The Air Force gave the Zaman relays an overt designation, Satellite Data System (SDS) (NRO, 1969g; [] 1969; Roth, 1991; [] 2003).⁴

~~(TS//TK)~~ Three considerations prompted the ExCom to entrust SAMSO with the Zaman relays. Funding everything through Air Force channels would hold down the National Reconnaissance Program (NRP) budget. Otherwise, the projected costs of the relays would, for the first time, push that budget over the [] mark, a potentially sensitive funding threshold that neither the NRO leadership nor ExCom members wished to defend before Congress. Shifting funding elsewhere was not unique to the Zaman relays, having been practiced in other NRO programs (Roth, 1991; [] 1998).

(b)(1)

(b)(3)

~~(S//TK)~~ A second consideration was mission security. The security blanket surrounding every satellite reconnaissance program was intended to protect, for as long as possible, information about program specifics, including mission capabilities, technology, and operating procedures. Zaman would have [] components — []

[] that characterized the film return systems, Corona and Gambit. Moreover, Zaman's spaceborne components would be physically separated by [] once they became operational. Hostile intelligence was going to have a difficult time tying imaging and relay satellites with the [] and seeing them as a [] much less as an electro-optical imaging system operating in near real time. Consigning the relay satellites to another organization as an overt

(b)(1)

(b)(3)

⁴ (U) The relay program actually went through several names before becoming SDS. I will use SDS throughout this article in the interest of simplicity.

~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

program would make it still more difficult for hostile interlopers to arrive at correct conclusions (Bissell, 1970).⁵

~~(TS//TK)~~ Third, there was the matter of experience and expertise. Since the beginning of the American space program in the late 1950s, the Air Force Satellite Control Facility (AFSCF) had monitored and controlled NRO reconnaissance satellites from its headquarters site in Sunnyvale, California, and a number of remote tracking stations scattered around the globe. The AFSCF discharged its responsibilities in a credible manner, but was there a better way to command and control satellites [redacted] 2001)?

(b)(1)
(b)(3)

~~(S//TK)~~ In FY 1968, the Aerospace Corporation, a federally funded research and development corporation focused on national security space, and SAMSO began searching for an answer to the question whether there was a better way to command and control satellites. The quest centered on using a constellation of relay satellites rather than ground stations to maintain contact with other satellites. SAMSO's [redacted] managed that endeavor into early 1969 when funding ended. Still, SAMSO and Aerospace personnel had gained valuable experience exploring theoretical possibilities for relay satellites. That experience could be put to good use in the SDS program (NRO, 1992).

(b)(1)
(b)(3)

~~(S//TK)~~ Program B and SAMSO Select Relay Satellite Program Managers

~~(TS//TK)~~ In October 1969, Dirks named his Assistant Division Chief, [redacted] as Program B's manager for the relay satellites. [redacted] was the quintessential workaholic. His management style was conservative, thorough, and detail oriented to a degree that sometimes annoyed those who did business with him. He maintained virtually every scrap of paper relative to the relay program, kept copious notes, and even insisted that his staff type detailed synopses of telephone calls. His loyalty to and support of his staff won their respect, and his in-depth knowledge of every aspect of the relay program made him a highly effective representative for the NRO (NRO, 1992; Dirks, 1969; [redacted] 2003; [redacted] 2003; [redacted] 2003; [redacted] 2003; [redacted] 2003; Cromer, 2003).

(b)(1)
(b)(3)

(b)(1)
(b)(3)

~~(TS//TK)~~ At about the same time, the SAMSO Commander, Lieutenant General Samuel Phillips, selected three colonels as candidates to manage the SDS program for the Air Force. He then left it up to Charles Roth, who managed the overall Zaman program, and Dirks to choose from among the candidates which officer they wanted to work with. They selected Colonel [redacted] West Point class of 1944, Naval War College graduate, and former test pilot [redacted] 2003).

⁵ ~~(TS//TK//SI)~~ The Zaman security blanket worked reasonably well in the long run. Not until July 1978, [redacted] did the Soviet Union start notifying military units of the [redacted]

(b)(1)
(b)(3)

~~TOP SECRET//SI//TK//NOFORN//25X1~~

(TS//TK) [] lacked [] appetite for details, but he was mission oriented, gentlemanly, and technically capable. Whatever the differences in the personalities and management styles, the two men quickly established a sound working relationship destined to endure until [] retired from military service in early 1973. [] in later years, generously credited [] a modest man, with much of the early success of the relay program, an opinion shared by more than a few [] 2003; [] & Roth, 1992; [] 2003; [] 2003).

(b)(1)

(b)(3)

(TS//TK) Although the projected magnitude of the SDS program pointed toward a staff of perhaps [] [] disliked large numbers of subordinates and opted to operate with a hand-picked cadre of only [] The Aerospace Corporation would provide engineering services using about the same number. [] had a staff of only [] a number mandated by Dirks' way of doing business. Dirks authorized only a small number of personnel for each program under his jurisdiction, gave them the authority they needed to accomplish their missions, and held them strictly accountable. Small numbers or not, the first order of business for the [] team was to establish jointly the security and management plans that would govern the program. Those plans had to satisfy SAMSO, Air Force Headquarters, and the NRO simultaneously (NRO, 1992; [] & Roth, 1992).

(b)(1)

(b)(3)

(TS//TK) Major (later, Lt. General) Don Cromer, a payload specialist on [] staff, drafted the initial security plan. Air Force Headquarters wanted all procedures and policies to be in line with similar programs managed by the service. Accordingly, SAMSO designated the SDS program as collateral Secret with a "Special Access Required" (SAR) annex. The SAR portion of the program would allow the release of selected information about the NRO payload without divulging critical items that might compromise its mission. There would be no mention of the NRO at any collateral level.⁶ Air Force correspondence classified collateral Secret/SAR would occasionally reference a mysterious "User A," but even those who were SAR cleared would have no idea that User A was NRO Program B. The NRO Program B connection and details of the NRO payload would be confined to a Byeman annex available only to those with the proper access (NRO, n.d. b; NRO, n.d. c; NRO n.d. d; [] 1969a; [] 1970a).

(b)(1)

(b)(3)

(S//TK) To be sure, the security arrangements required some coordination to satisfy all concerned, but there does not appear to have been any major problems reaching agreement. Unfortunately, the same could not be said of the first attempt at a management plan. Incorporating two powerful entities — the regular Air Force and the NRO — may have brought together two very capable organizations, each with a treasure trove of talent, but each also brought to the table ideas and objectives that did not always comfortably mesh with each other.

⁶ (U) Collateral level material refers to national security information classified confidential, secret, or top secret for which no special intelligence compartmentation system — such as sensitive compartmented information or SCI — is formally established.

~~TOP SECRET//SI//TK//NOFORN//25X1~~

(U) Divisive Issues for the Air Force and NRO

~~(S//TK)~~ The divisive issues for the Air Force and the NRO involved the managerial framework within which to undertake SDS development, division of authority between the NRO and the Air Force, and whether or not to share the satellites with other users. An initial management plan, drafted in October 1969 at SAMSO, called for a program office exclusive of [] dedicated solely to satisfying NRO requirements, and responsible only to Program B. That arrangement clearly reflected NRO thinking, but the Air Force had something quite different in mind. The service saw itself as more than a junior partner. It was, after all, the provider of funds, personnel, expertise, and offices. In hindsight, it should not have come as much of a surprise when prominent Air Force leaders concluded that they should have a greater say in and derive greater benefit from the program.

(b)(1)
(b)(3)

~~(S//TK)~~ The first hint of conflict came when Headquarters Air Force rejected SAMSO's proposed management plan. The most vigorous spokesman for an alternate arrangement was Brigadier General Walter R. Hedrick, Jr., the Director of Space, Deputy Chief of Research and Development. He wanted several changes to make the SDS Program more compatible with the Air Force's way of doing business, but, most importantly, he wanted SDS satellites to serve both the Air Force and the NRO. By that he meant that the Air Force should have the opportunity to integrate additional systems and place a secondary payload, or payloads, aboard each and every SDS satellite. Hedrick saw no detriment to the NRO mission; the Air Force payloads would operate independently and on a non-interference basis. Although not specifically stated at the time, it would also be easier to justify SDS as an Air Force program if its satellites carried an Air Force payload or payloads (Hedrick, 1969; McLucas, 1970; [] 1970b; [] 1970c; [] 1970d; [] 1970e; NRO, 1971a).

(b)(1)
(b)(3)

~~(S//TK)~~ NRO Program B, on the other hand, had an entirely different perspective. SDS satellites were intended to carry a single NRO payload, and that was the way it should stay. The sharing arrangement proposed by the Air Force raised in the mind of Dirks, [] and others the possibility that the NRO might become a mere customer on its own relay satellite and have its covert mission compromised in the process. Those ominous possibilities sparked recommendations within the NRO to consider alternate arrangements, including ending the attempt to do business with the Air Force, funding the relay satellites through the NRP, and accepting the consequences of a budget that exceeded [] (Hedrick, 1969; McLucas, 1970; [] 1970b; [] 1970c; [] 1970d; [] 1970e; NRO, 1971a).

(b)(1)
(b)(3)

~~(S//TK)~~ [] and [] discussed the disagreement in a 31 October 1969 phone conversation. [] knew he served two masters, the NRO and the Air Force, but that did not concern him. He and SAMSO were dedicated to satisfying NRO requirements regardless of how the payload dispute was ultimately resolved, evidence that Air Force discontent was confined to the upper echelons of the service. Nevertheless, given Air

~~TOP SECRET//SI//TK//NOFORN//25X1~~

Force funding, the Colonel believed that some sort of compromise was inevitable, one that allowed for single purpose development that could later be adapted to satisfy Air Force requirements [] 1969b; [] 1969c; Cromer, 2003).

(b)(1)
(b)(3)

~~(TS//TK)~~ By late November 1969, pressure to cobble together some sort of management agreement resulted in movement on both sides. General Hedrick went on record firmly supporting the NRO mission and accepting NRO technical guidance, but still rejected a dedicated relay program office outside the [] structure. Early in the new year, Dirks and Roth accepted the possibility of secondary payloads, but they demanded a firm guarantee that the NRO mission had priority. The Air Force responded by stating that NRO requirements would receive priority in all payload configurations. Which additional payloads to incorporate aboard the relay satellites needed further study, but the NRO would control its payload and no failure experienced by another payload would affect the NRO mission (Hedrick, 1969; [] 1970a; [] 1970l; NRO, 1971c; Cromer, 2003; NRO, n.d. e).

(b)(1)
(b)(3)

~~(S//TK)~~ An interim management plan, signed by NRO and Air Force officials in early March 1970, reflected compromise. The NRO accepted the management changes demanded by the Air Force while the Air Force guaranteed the NRO mission priority. Both parties agreed to defer a decision on additional payloads, pending more information upon which to base judgments. Both sides pledged close cooperation. The agreement, soft though it may have been in some areas, at least cleared the way to begin the competition among eligible civilian firms to determine which would fabricate the relay satellites (NRO, n.d. e; [] 1970l).

~~(S//TK)~~ The Contract Definition phase of the competition began in August 1970, a few months later than originally scheduled. It pitted Hughes Aircraft Corporation against the firm of [] and was going smoothly. Unfortunately, things were going less well with regard to secondary payloads. In the summer of 1970, the Program Office of Project 647 — an early warning satellite network in a geosynchronous orbit and the only candidate for the secondary payload — began to have reservations about using SDS relays. Late in the year (exact date unknown), the Project 647 Program Office withdrew itself from consideration in favor of autonomously relaying its own data. That decision returned the SDS program to dedicated satellites with a single payload [] 1970f; [] 1970g).

(b)(1)
(b)(3)(b)(1)
(b)(3)

(U) Return to a Dedicated NRO Mission

~~(TS//TK)~~ The turn of events delighted those NRO Program B members who had always resented additional payloads as a “shotgun wedding” forced on them by the Air Force. They still wanted a dedicated satellite and periodically said so in correspondence. Be that as it may, Project 647’s withdrawal raised questions that had to be dealt with. The most serious question, now acknowledged within NRO Program B, was whether the SDS program should continue as an Air Force enterprise without an Air Force payload. Both

~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

McLucas and [] now saw the real possibility of having to move the program into the NRP, making it entirely covert, and having the NRO assume funding and management [] 1970; [] 1971; [] 1970h; NRO, 1971d; [] 1970i).

(b)(1)
(b)(3)

~~(S//TK)~~ The return to a dedicated satellite proved particularly distasteful to Grant Hansen, Assistant Secretary of the Air Force for Research and Development. Hansen, a supporter of dual or multiple users on SDS satellites, discussed the matter during a January 1971 meeting attended by Roth, McLucas, [] and []. He had fully expected a Project 647 payload, and now he was in a difficult position. In testimony before Congress, he had justified the SDS program on the basis of it having more than one user, and he now faced the embarrassing prospect of again appearing before that body to explain why that had not happened. Hansen made his displeasure apparent to all by suspending funding to the SDS Program and placing the program on temporary hold effective the end of the month [] 1971; [] 1971a).

(b)(1)
(b)(3)

~~(S//TK)~~ Hansen's directive was not as threatening as it might seem at first glance. Almost certainly, his goal was only to pressure the NRO and SAMSO to search more aggressively for other payloads, in particular Air Force payloads, which would return the relays to at least dual use and spare him an unpleasant meeting with Congress. Even if no other payloads could be found, any delay to the program would have been brief. Zaman had to have relay satellites whatever the number of users and regardless of whether the present Air Force-NRO relationship remained intact or the relays had to be moved into the NRP.

(U) Orbital Configuration

~~(TS//TK)~~ Elsewhere, attention had turned to one of the last major issues of the Contract Definition Phase, the orbital configuration of the satellites. By the time Contract Definition began in August 1970, only three orbital configurations remained under active consideration — []

[] All others had been eliminated because, in the words of [] an Aerospace engineer providing technical support for the program, "We went through . . . them and they didn't make any sense" [] 2003, p.14). Unlike payload studies, which were conducted only by Hughes [] other firms made significant contributions in selecting the orbital configuration. The other firms — []

(b)(1)
(b)(3)

[] — were competing for the imaging satellite contract, which gave them insights into and a vested interest in the relays. Hughes [] and all imaging satellite competitors assayed [] orbits. Hughes [] and one other firm (identity unknown) examined [] options (NRO, 1971e).

(b)(1)
(b)(3)~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~(S//TK)~~ The orbital configuration studies and their recommendations arrived at SAMSO and the Zaman Program Office in December 1970. There was no clear-cut winner as each configuration had both strengths and weaknesses. [] [] the favorite among many associated with the relay program, was the first eliminated. It offered good coverage, but its price tag — [] over a [] period — was the highest among the three options, and it had an unacceptable level of technical risk. That limited consideration to the two options with satellites in [] 2003; NRO, 1971e; [] 1970j; [] 1971b).

(b)(1)
(b)(3)

~~(S//TK)~~ The two [] options had enjoyed varying degrees of popularity since at least 1968, but had never held center stage because they offered less coverage than did the []

[]

[] (NRO, 1970a; NRO, 1970b; Roth, 1971a; NRO, 1970c; [] 1970g; [] 1970; [] 1970h; [] 1971b).

(b)(1)
(b)(3)~~(TS//TK)~~ []

[]

[] 1970k).

~~(S//TK)~~ [] and his staff agreed that [] configurations met basic Zaman requirements, i.e. [] agreed, but doubted that he could justify the higher cost of the [] to his superiors. Accordingly, he put SAMSO on record as favoring the [] almost certainly knew the [] configuration was the best choice by far. He could have mandated that choice then and there, but he stayed his hand, probably out of respect for [] and acknowledgement of the financial pressures he endured. Instead, [] ordered further study of the [] options before making a final decision, but he signaled his preference by ordering work to continue using the [] option as the basis of planning. Not surprisingly, the studies only strengthened the case for the [] orbit, and [] had no hesitation in mandating it as the configuration of choice for Zaman [] 1970k; NRO, 1970d; NRO, 1971f; NRO, 1971g; Roth, 1971b; Cromer, 2003).

(b)(1)
(b)(3)~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

(U) Secondary Payloads and a Funding Crisis

~~(S//TK)~~ In the meantime, [] and his staff had been busy canvassing other Air Force programs in search of additional payloads. By early March 1971 the renewed and expanded search had assayed at least six possible secondary payloads before settling on two apparently acceptable prospects — payloads to support the Air Force Satellite Control Facility (AFSCF) and payloads to support the Single Integrated Operations Plan (SIOP) (NRO, 1971h; NRO, 1971i; Roth, 1971c; [] 1971a).

(b)(1)
(b)(3)

~~(S//TK)~~ The AFSCF, as I noted earlier, had been supporting satellite operations since the late 1950s via a worldwide network of tracking stations. In 1958, there was only one station, located in Hawaii. The Sunnyvale station opened in 1959, as did stations in New Hampshire and California. In the 1960s, three additional facilities opened their doors — Thule, Greenland (1961), the Seychelles Islands (1963), and Guam (1965). A later station in England (1978) completed the network. The SDS support for the AFSCF mission meant incorporating a small S-band transponder on each satellite to relay communications between the headquarters facility and its remote tracking station at Thule, Greenland, and end dependence on unreliable land lines. The [] orbits of the SDS relays were ideal for the task [], 2001; [] 2003; [] 1988).

(b)(1)
(b)(3)

~~(S//TK)~~ The SIOP was the nation's blueprint for general nuclear war. Although strategic missiles steadily increased their importance to the SIOP during the 1960s, bombers and tankers of the Strategic Air Command (SAC) were still major contributors. Bombers and tankers, unlike missiles, could be launched in times of extreme crisis, later recalled or ordered to proceed to their targets, or even have their targets changed while airborne. That made reliable command and control communications a vital consideration. On into the 1970s, command and control communications depended on high frequency broadcasts, which had worldwide range, but were vulnerable to jamming by hostile powers and disruption from the effects of nuclear detonations. []

[] payloads on SDS satellites would provide [] and [] be less vulnerable to disruption (NRO, 1971j).

(b)(1)
(b)(3)

~~(S//TK)~~ SIOP Payload Proves Problematical

~~(S//TK)~~ Secretary Hansen, though still smarting from the earlier withdrawal of Program 647, expressed satisfaction with the new payloads and lifted his hold order on 12 March 1971. The secondary payload problem was not over, however. The SIOP payload proved problematical, something that [] had suspected. Described in later years as a "heavy mother," the SIOP payload required a helix antenna, transmitters, receivers, additional solar cells for power generation (it was a power hog), and cabling and structures weighing over 300 pounds. In late May 1971, both Hughes [] the two firms competing for the acquisition contract, found it not to be a good candidate.

(b)(1)
(b)(3)~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

Accordingly, General Phillips, the SAMSO commander, ordered the two contractors to amend their effort to include only the AFSCF package as a secondary payload. The SIOP payload was out of the running (NRO, 1971j; [] 1971a; NRO, 1971k; [] 1971c; NRO, 1971i).

(b)(1)
(b)(3)

~~(S//TK)~~ The decision to incorporate only the AFSCF payload tipped the SDS Program into crisis. The reality for the Air Force was that, despite funding and managing the program for almost two years and having many of its demands met, the service remained decidedly a junior partner. The NRO had mandated the critical feature of the system, most notably the [] configuration. In all cases, the NRO had based its decisions on operational factors while the Air Force had made cost a primary consideration. True, the addition of an AFSCF payload would give the Air Force numerical parity in payloads, but it would be a payload of little importance, particularly when compared to some of those considered and rejected. Thus, the Air Force found itself saddled with all the problems associated with a complex and difficult program from which it probably was going to realize little benefit and over which it could not demonstrate an acceptable span of control [] 1971).⁷

(b)(1)
(b)(3)

~~(S//TK)~~ Beyond the question of "who really owned the satellites" was the problem of program justification. There is every reason to believe that by May 1971 Hansen no longer believed that a single additional payload, even an Air Force payload, would secure funding for the SDS program. The fact that many members of Congress did not possess Byeman access authorization meant that he could only refer to the NRO payload as belonging to "User A," a designation that offered little support for his argument. Even within the Air Force, few members within the headquarters directorates that reviewed and approved the relay program as an Air Force project had the requisite access authorization. Here, too, staff personnel must have questioned an expensive program dedicated to an inconsequential mission, the AFSCF, and a vague entity referred to as "User A" about which they knew nothing. Similar problems must have surfaced in Air Force efforts to gain support from other agencies and organizations. Even Dirks did not believe that a single secondary payload was sufficient to protect funding (Dirks, 1971a).

~~(S//TK)~~ Further discussions did not resolve the matter, and that prompted the Air Force to stage a showdown. Shortly after the decision to incorporate only the AFSCF payload, a review board, which included representatives from Hansen's office, slashed FY 1972 relay program funding from []. The reduction was designed to force inclusion of another secondary payload, presumably SIOP, whatever the difficulties involved, or move the entire relay program into the NRP. Taking the former course of action would maintain the existing NRO-Air Force relationship; taking the latter course would end it. The ball was squarely in the NRO's court (NRO, 1971m; NRO, 1971n).

(b)(1)
(b)(3)

⁷ (U) I am deeply indebted to [] for informally laying out the funding and political problems underlying the relay program during much of 1971. Those problems were not at all apparent in available archival material and oral interviews.

~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~(S//TK)~~ Although they were serving Air Force officers, General Phillips and [] [] protested the funding cut. Both men remained loyal to the relay program as scheduled and funded, further evidence that the issues between the NRO and the Air Force were confined to the upper echelons. McLucas made a last-ditch effort to get a minimum level of funding restored, but failed. The relay program had essentially been reduced to a minimum effort until the Air Force and the NRO struck an acceptable agreement or the relay program was moved into the NRP (NRO, 1972a; NRO, 1971o; NRO, 1971p).

(b)(1)
(b)(3)

~~(TS//TK)~~ The Air Force's hardball tactics paid off. A study signed by Air Force [] a member of NRO Program A, recommended against terminating the existing relationship with the Air Force. Shutting down the SAMSO office while creating a similar NRO office would be a complex endeavor that could delay the program for up to six months. Terminating the overt Air Force funding and creating its covert equivalent in the NRP would be difficult since all FY 1972 monies were already in the Air Force budget. Further, it would be hard to conceal adequately the activity associated with a move to the NRP, and that might result in security compromises. The current arrangement might be fraught with difficulties, [] concluded, but it was still the better option [] 1971).

(b)(1)
(b)(3)

~~(S//TK)~~ Return to Including a SIOP Payload

~~(TS//TK)~~ In view of [] recommendation, it probably surprised few when in July McLucas informed the ExCom that incorporating a SIOP payload was once again under active consideration. On 10 September, McLucas flew to SAMSO where he met Phillips, [] and others to discuss a UHF transponder to support the SIOP mission. The NRO Director approved the inclusion. Hughes [] would now have to re-think their previous work and combine everything into a single proposal that encompassed satellites with three payloads — NRO, AFSCF, and SIOP.⁸ The decision freed up the necessary funds, preserved the existing NRO-Air Force relationship, and defused the crisis (NRO, 1971m; [] 1971; Roth, 1971d; NRO, 1971q; NRO, n.d. i; Roth, 1971e).

(b)(1)
(b)(3)

~~(S//TK)~~ The integration of the SIOP payload preserved the NRO-Air Force relationship and the funding returned the relay program to full operation, but the disruptions of the last several months had consequences. In particular, the near-term schedule was no longer viable. Hughes [] needed about two additional months, until November, to re-work their technical proposals and pricing to accommodate the additional payload. That would, in turn, delay award of the system acquisition contract until at least January 1972 and push back the start of system acquisition until March. But even that schedule would shortly encounter still other difficulties related to the utility of the SAR portion of the program and demands to re-address management and security arrangements.

(b)(1)
(b)(3)

⁸ ~~(S//TK)~~ Most often referred to in the documentation as, respectively, MAPS (Mission A Payload System), Mission 22 and Mission 34.

~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

(U) Readdressing Management and Security Arrangements

~~(TS//TK)~~ By the spring of 1971, elements within the Air Force considered SAR to be unnecessary, even detrimental, not only to the SDS program but to all Air Force satellite programs. The Air Force's SAR programs numbered only three, all with NRO connections. Anti-SAR spokespersons argued that the caveat added little to security and hampered staff actions with individuals and offices not SAR cleared. With regard to the SDS program, sensitive information could still be protected by a strictly enforced need to know that did not require a separate SAR category, or the NRO, if it wished, could withdraw all SAR information into the Byeman security compartment [] 1971; [] 1971).

(b)(1)
(b)(3)

~~(S//TK)~~ The argument easily persuaded Lt. General Otto Glasser, Headquarters Air Force Deputy Chief of Staff for Research and Development, whose directorate had obligations to all three SAR programs. The SAR caveat and the difficulties it created had long irritated him. He particularly had objections to the SAR portion of the SDS program; in fact, he had disliked all aspects of the SDS program and having to share it with the NRO. On more than one occasion he recommended to McLucas that the SDS program in its entirety be returned to the NRO. He even offered to assist in the transfer, but was rebuffed; McLucas preferred the existing arrangement. Removing the SAR caveat from all three programs would at least reduce one irritant, and that was what Glasser recommended in a letter to the NRO [] 1972).

(b)(1)
(b)(3)

~~(TS//TK)~~ The letter ended up on the desk of Deputy NRO Director F. Robert Naka in late June 1971. Naka disapproved the request because he believed that the SAR caveat had imparted needed information to selected individuals (without Byeman access) to outweigh the problems it created. He removed the SAR caveat from one of the three programs, but not SDS. The reply displeased the General. In a return note to Naka, he stated his acceptance of the decision and his understanding of the reasoning behind it, though he remained firmly in disagreement (Naka, n.d.; Glasser, 1971).

~~(S//TK)~~ Still, General Glasser had a point. Most SDS management and security arrangements had been worked out in the fall and winter of 1969 when things were simpler. Problems involving additional payloads and funding lay in the future. By late 1971 that was no longer true, and pressure to re-think all management and security arrangements was growing. The fact that the SDS program would soon enter system acquisition with an as-yet-undetermined civilian firm added another dimension that needed to be considered. This time it was the NRO that acted. In January 1972 McLucas reversed the earlier decision by canceling the SAR portion of the SDS program, and withdrew all SAR material into the Byeman compartment, just as General Glasser had wanted. Most of all, McLucas wanted to improve management and provide for better security once the program entered system acquisition (NRO, 1971r; [] 1971b).

(b)(1)
(b)(3)~~TOP SECRET//SI//TK//NOFORN//25X1~~

(U) Management Resolution

~~(TS//TK)~~ There was certainly no shortage of recommendations on what the new management and security arrangements should be. NRO Program B, SAMSO, and various levels of the Air Force all submitted ideas. At one extreme were those diehard Program B members who had never truly reconciled to sharing the relay satellite program with the Air Force. They wanted to end that relationship once and for all. The relay program, they argued, should revert to NRP funding, become totally covert, be entirely under Program B management, and have Byeman security controls (NRO, 1972b).

~~(TS//TK)~~ General Phillips, [] and the SAMSO staff took a more moderate position. They did not believe that an entirely covert program was necessary, but they thought security should be tightened. The Byeman security compartment must be employed to protect certain information — bandwidth, near-real-time operations, [] transmissions, specific frequencies, and the NRO relationship — just as in the past. Their proposal, however, took the reasoning a step further by recommending that any and all references to the NRO, even referring to “User A,” be restricted to Byeman channels. Collateral documents would refer only to the secondary payloads and state that SDS satellites were deliberately “over engineered” as a contingency should the Air Force at some point wish to add additional missions. Those personnel associated with the program but without Byeman access should be told that the “User A” payload had been deleted (Dirks, 1971b; NRO, 1972c; NRO, 1972d).

(b)(1)

(b)(3)

~~(TS//TK)~~ What finally emerged after all recommendations had been compiled were six options, each covering responsibility for five areas — security, contracting, funding, tech requirements, and management. Three options proposed to make the relay program covert and an equal number, called “Hybrids,” had a mix of overt and covert parts. At one extreme, was a totally covert program within the Program B, the approach advocated by those previously mentioned NRO members who did not accept Air Force participation. The other extreme was a “hybrid” option much like the existing program. There was no broad agreement within either the Air Force or the NRO as to which option was best. Like so many other aspects of the program, the final decision lay with the NRO, specifically with McLucas (Bradburn, 1972; NRO, n.d. f; [] n.d.; Wheeler, 1975).

(b)(1)

(b)(3)

~~(TS//TK)~~ McLucas announced his decision at the 20 April 1972 meeting of the ExCom. The NRO Director was still satisfied with the existing management arrangements despite problems experienced along the way. The SAMSO would continue its management role, Program B would exercise technical oversight, and the Air Force would fund and defend the program. His only significant management change established a more streamlined chain of command stretching from SAMSO to the Secretary of Defense level. The streamlining answered some Air Force complaints about managing a program that had both overt and covert components (McLucas, 1972a; [] 1972).

(b)(1)

(b)(3)

~~TOP SECRET//SI//TK//NOFORN//25X1~~

(U) Security Resolution

~~(TS//TK//SI)~~ Security was another matter, however, and here the NRO Director made several major changes. He shifted covert contracting and Byeman security responsibilities from Program B to Program A, a move that both strengthened the appearance of a strictly Air Force endeavor and enhanced Air Force authority over the program. He ordered that there be no further mention whatsoever of a third payload outside the Byeman system, just as SAMSO had recommended. He softened his earlier position that all SAR material be compartmented Byeman, allowing that carefully selected SAR material might be released at the collateral level. After a brief discussion, mostly related to security, the ExCom endorsed McLucas's decision (NRO 1972e; NRO 1971s; [] 1972).

(b)(1)
(b)(3)

~~(S//TK)~~ Over time, the new security arrangements translated into directives and policy letters. Public releases acknowledged only that SDS was an Air Force satellite system with multi-mission communications capability. Support for the SIOP and the AFSCF was stated, but only in general terms. Because it was the more important of the two, SIOP support got top billing. There was no hint of any other payload, either extant or planned. Other information prohibited from public release included number of satellites, orbits, technical descriptions, launch dates, finances, and any mention of associated ground facilities (McLucas 1972b; NRO, 1972f; NRO, 1972g).

~~(S//TK)~~ Information releasable at the collateral security level contained the usual prohibitions against association with the NRO, communication data rates and frequencies, and a Zaman mission ground station located in the [] United States. The roles of the AFSCF and SIOP payloads were spelled out in detail, as was the imminent award of the system acquisition contract and some information on Air Force funding. The SDS satellites could support additional space communications requirements if so directed, but, as in public releases, there was no mention of a third payload. Even mentioning that the satellites carried [] was taboo at the collateral level. Collateral security documents destined for Congress carried the same prohibitions (NRO, 1972h; NRO, 1973; NRO, 1974).

(b)(1)
(b)(3)

(U) System Acquisition and Early Operations

~~(U//FOUO)~~ On 5 June 1972, SAMSO announced that Hughes had prevailed over [] for the system acquisition contract. Six months later, [] retired from military service after 29 years in uniform. His successor was [] a graduate of the Naval Academy. [] aggressive and capable, made two important changes. Working with [] a Hughes engineer assigned to the SDS program, he detailed a number of Byeman-authorized officers, usually captains and majors, to work at Hughes because the company was having problems getting a sufficient number of its own personnel cleared. The officers, all wearing mufti, served mainly in

(b)(1)
(b)(3)~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

managerial roles, and even took over some projects. Their presence, which proved to be beneficial to both the Air Force and to Hughes, lasted until resolution of the access problem (Iorillo, n.d.).

~~(TS//TK)~~ In September 1973, [] left to become Program B's representative at Lockheed, the firm building the imaging satellite. [] seized the opportunity to propose a major change in NRO-Air Force relations. It was no longer necessary, he argued, to have someone like [] closely involved in SDS management. The program was now four years old and had matured to the point where [] could oversee and accept complete responsibility for it. He proposed to keep Program B informed and involved by assigning a field grade liaison officer to the Kennen Program Office.⁹ Interestingly, Roth, a fellow Naval Academy graduate, had been thinking along those same lines. He readily accepted the idea, and the first liaison officer, [] arrived shortly after [] departed. The new arrangement remained in place for the duration of the Air Force's involvement in the relay program (NRO, n.d. g; [] 2003; [], 2004).

(b)(1)
(b)(3)

~~(S//TK)~~ Mostly, however, [] and his successors had to deal with any number of problems, large and small, that befell the program over the next decade. Without going into details, Hughes built and the Air Force launched [] relay satellites during the period. The launch of the [] took place on [] the exact date selected years earlier. The [] soared aloft on [] and on [] (accounts vary) the [] the first time [] The first Kennen imaging satellite went into orbit on 19 December 1976 and four days later transmitted its first images to the mission ground station via one of the relays [] carried aloft by a Titan booster on [] was the first to incorporate a third secondary payload, one that searched for evidence of []

(b)(1)
(b)(3)

~~(S//TK)~~ SDS Becomes []

~~(TS//TK//SI)~~ All this activity took place against a background that heralded the end of Air Force participation in the SDS program. The first hint of change came in October 1976 when the Air Force announced long-range plans that did not include SIOP payloads on Kennen relay satellites. Instead, those payloads would go aboard satellites

⁹ ~~(S//TK)~~ Zaman became Kennen in January 1972.

¹⁰ ~~(S//TK)~~ []

¹¹ ~~(S//TK)~~ Why there was an [] is a complex story that exceeds the scope of this narrative.

(b)(1)
(b)(3)~~TOP SECRET//SI//TK//NOFORN//25X1~~

~~TOP SECRET//SI//TK//NOFORN//25X1~~

of the forthcoming Military Strategic, Tactical, and Relay (MILSTAR) program.¹² The MILSTAR specifications called for three satellites in 125,000-mile high orbits, but later changed to four satellites in geosynchronous orbits. A still later modification called for another three satellites in polar orbits to assume the mission performed by Kennen relays. (Initial projections placed MILSTAR's initial operating capability in 1982, but that date repeatedly slipped. Kennen relays carried SIOP payloads on into the 1990s) (NRO, 1976; NRO, 1981; Cromer, 1981; [] 1981; NRO, 1982a; Dirks, 1981).

(b)(1)
(b)(3)

~~(S//TK)~~ The MILSTAR presented the NRO with a problem far greater than the pending loss of a secondary payload. A major factor in the NRO-Air Force arrangement had been the importance of the SIOP payload in justifying funding in non-Byeman channels. The question, by now a familiar one, was: would the loss of the SIOP payload make it unlikely that the SDS program could be justified in those same non-Byeman channels?

~~(TS//TK//SI)~~ The NRO entertained two options for dealing with the problem. One option was to incorporate Kennen relay payloads on MILSTAR satellites. Leslie Dirks, now the CIA's Deputy Director of Science and Technology and Director of NRO Program B, asked two members of his staff, [] to investigate that possibility. What they produced became known as the [] 2004).

(b)(1)
(b)(3)

~~(TS//TK//SI//X1)~~ [] found that MILSTAR satellites were going to be large enough to accommodate as many as 13 missions, so physically incorporating NRO payloads would not be a problem. There were, however, a number of negative considerations. The multiple payloads projected for MILSTAR satellites might make them overly complex, and thereby pose technical risk; the other payloads might produce harmonics and modulations detrimental to the NRO mission, and integration costs, which the NRO would have to bear, would be high. There was also the question of whether another satellite would be launched in response to a failed NRO payload since it would be a secondary mission. Accordingly, the two men recommended against the MILSTAR option, a judgment that Dirks accepted. That limited consideration to the only other option, one that had long hovered over the program — withdraw from SDS, move the relays into the NRP, implement NRO funding, and institute overall Byeman security measures. NRO Director Edward Aldridge approved that option in November 1981 [] 2004; NRO, 1982b).

(b)(1)
(b)(3)

~~(TS//TK)~~ Aldridge's decision ignited a lively debate over how the relay program should fit into the NRO and, in particular, who should control it. Brigadier General Jack Kulpa, Program A Director, lobbied vigorously for inclusion in Program A (Air Force) because the relays had been under Air Force management for over a decade. In his estimation, a transfer to Program A would have continuity and make good use of experience acquired by the Air Force in managing the program. Even if the decision went against him, Kulpa

¹² (U) MILSTAR was the name later given to that particular group of satellites. In its initial designation it was an as-yet unnamed part of the Military Satellite Communications (MILSATCOM) system.

~~TOP SECRET//SI//TK//NOFORN//25X1~~

believed that the gaining office should have a strong Air Force presence. Program B (CIA) wanted control because the Kennen program was a Program B enterprise, and functional integrity meant that Kennen, relay satellites included, should be managed as a whole. A third possibility, advanced by persons and offices not revealed in research, proposed creating a separate entity, NRO Program D, just to manage the relays (Kulpa, 1982).¹³

~~(S//TK)~~ The decision package probably arrived on Aldridge's desk in late February 1982, about the same time as did an eleventh-hour appeal by the SDS Director, Colonel Clyde McGill, and his immediate superior, Lieutenant General Richard Henry, the SAMSO commander, to maintain the status quo. Withdrawing the relay program into the NRP, they argued, benefited no one; indeed, it was detrimental. Both the NRO and the Air Force needed SDS to serve as a "bridge organization" that could work in both overt and covert worlds to ensure complete access to evolving technologies. General Henry pledged that Colonel McGill and SDS would have top priority in manning and other support in carrying out those responsibilities (NRO, 1982c).

~~(S//TK)~~ General Henry's initiative allows a summation of the evolution of NRO-Air Force relations dating back to 1969. He could not have taken that initiative without approval from the Headquarters Air Force, which meant that there had been a change of heart at that level. As noted earlier, the first few years of the SDS Program were fraught with a number of disagreements, almost all of them arising from the higher levels of Air Force. Over time, the service fought, with reasonable success, in getting modifications made. Those modifications comprised the inclusion of secondary payloads, management procedures in line with overall Air Force procedures, abolition of the SAR caveat, and establishment of a streamlined chain of command. All these changes favored the service, and all had been made by April 1972. After that, the archives contain no further complaints because the Air Force had achieved objectives sufficient to ease the management burden.

~~(S//TK)~~ The SDS program became a positive feature following the launch of the first SDS satellites in June 1976. With two, and then three, secondary payloads, the Air Force began realizing real operational benefits from its years of labor. Further, there were surely spin-offs that materially assisted other Air Force programs. When combined with the improved management procedures, the SDS program not only became tolerable, it became an asset worth preserving. Given those considerations, the only outstanding question, one not resolved by archival research or from oral interviews, is why General Henry waited to the last minute to try to save the program.

¹³~~(S//TK)~~ There had previously been a NRO Program D to manage national airborne assets (SR-71s and U-2s), but it ended about 1974 when those assets were transferred from the NRP to the larger Air Force.