History of

AIR FORCE SPACE COMMAND

January-December 1987

PAGES 36-46

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Sensors (U)

The Defense Support Program (U)

(U) The Defense Support Program (DSP) had been a remarkably accurate and reliable system of space-based missile warning sensors since its inception in November 1970.

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From these vantage points the operational sensors effectively scanned the Soviet ICBM fields and SLBM launch areas from a range of 22,200 miles in geosynchronous orbits. Each satellite's Schmidt telescope housed an array of lead sulfide infrared detector cells, each of which scanned an area of the earth's surface measuring b(1) in diameter. Each satellite spun about its axis at a b(1) to maintain proper orientation toward the surveiled areas. Under optimum conditions each sensor was capable of detecting and reporting an ICBM exhaust plume signature within

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(U) The "b(1)"

held in orbit at roughly the same longitude. The deployments of both the operational and limited reserve satellites would fortunately remain stable throughout 1987, although the command had no way of knowing that at the start of the year. As it had in 1986, the potential failure of one or more of the primary sensors haunted the command throughout each leaf of the calendar in 1987. Flight 10 had been on station for four years by the end of August 1986, and unavoidable signs of deterioration could be expected from the aging sensor during the new year. Flight 11 was likewise plagued by a reduction to dependence upon a backup state-of-health downlink, which (if it remained operational) might permit the sensor to function effectively through late 1988 by the best estimate. Flight 12, on station since May 1985, was anticipated to have years of reliable service left in its systems, barring the unforeseen. Unfortunately, the unforeseen was already evolving into the foreseeable as early as February 1986, when the command noted b(1)

DSP sensors had already experienced "some loss of system redundancy," creating a situation wherein "failure of a single string of components for either of these satellites could cause a loss of mission."4*

(S) The crux of Air Force Space Command's anxiety over DSP in 1987 remained the lack of a timely and reliable means of placing replacement sensors on station in those hemisphere-scanning gyres. The loss of the STS Challenger in January 1986 and daunting mid-air detonations of a brace of Titan 34B boosters in August 1985 and April 1986 had effectively derailed the scheduled replacement plans for the currently operational sensors. Despite coordination with the Air Staff and NASA, the most optimistic scenario for the replacement effort envisioned the launching of Flight 13 no earlier than late 1987, with a second launch via the new STS anticipated for October 1988. At year's end in 1986, General Robert T. Herres, CINCSPACE, had prudently ordered his staff to prepare a base-line contingency plan by which redeployment of DSP assets could minimalize shortfalls in surveillance coverage in the event that the system was reduced to a

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(S) During 1987 planning for effective operation of a numerically diminished DSP constellation thus occupied much of the time of that part of the headquarters staff concerned with space-based missile warning sensors. One of the most significant elements of the contingency planning was

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*(S) The fears of mounting problems with the sensors in 1986 proved well-founded, for during the year Flight 12

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On 1-2 June 1987, the command executed a feasibility demonstration of this concept.

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The actual execution of the feasibility demonstration was rated as "very successful" by the participants. A total of twenty-four hours of mission processing was conducted. The operation was "continuous and highly reliable. Both Link 1 and Link 2 quality were excellent.

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During the interim, planning continued on other scenarios for the constellation's operations.

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It was tacitly acknowledged that the newest and most sensitive

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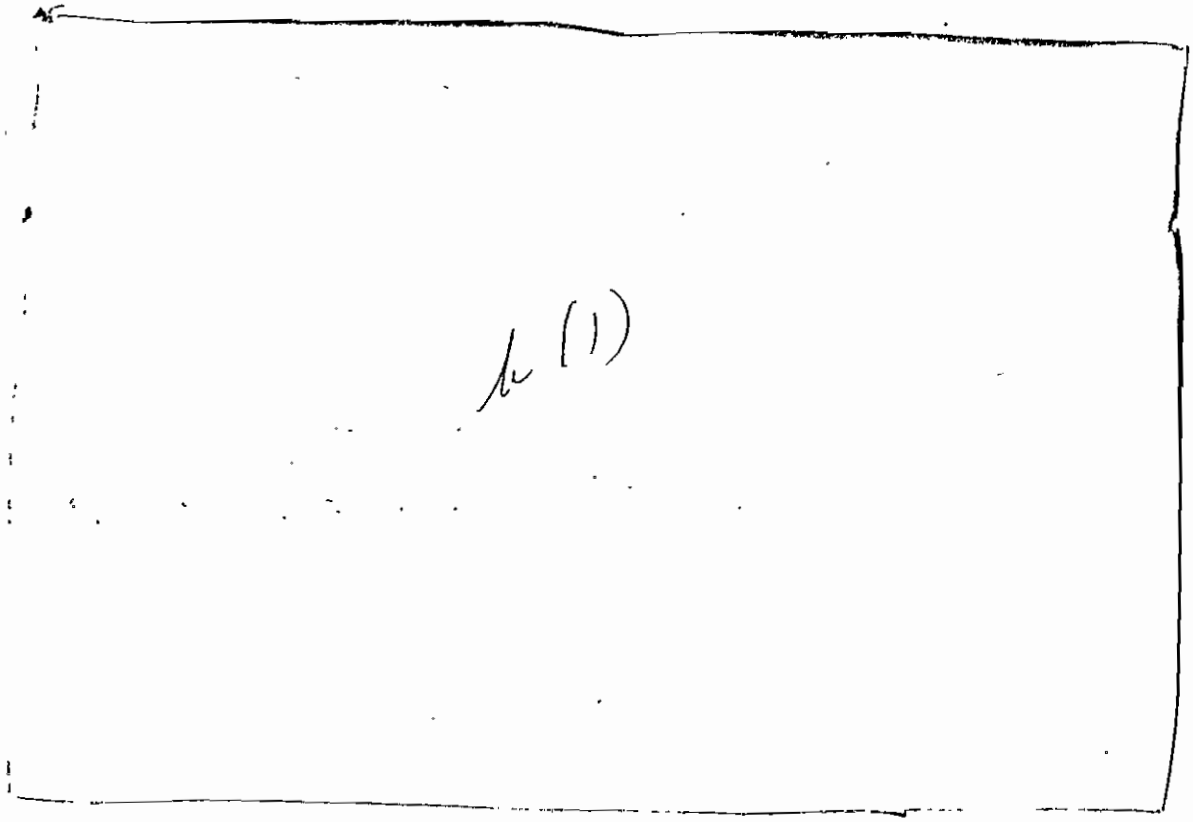
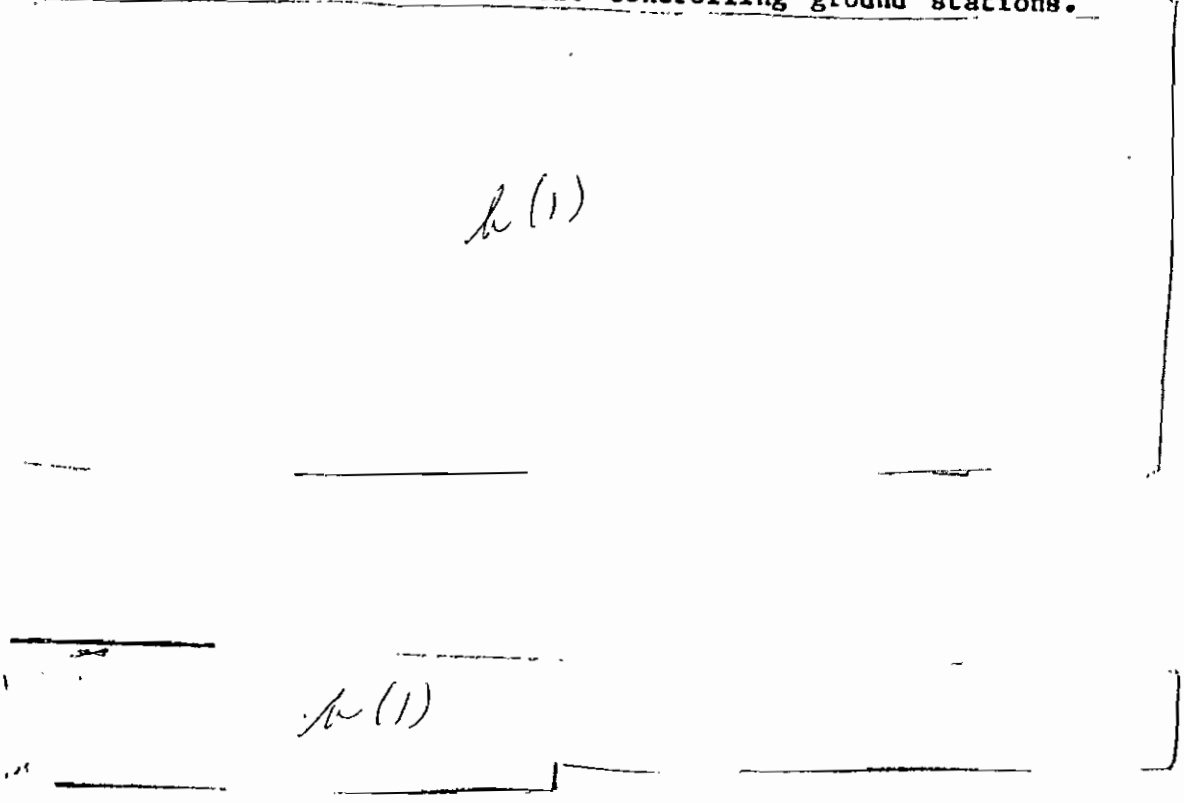


The deployment scheme was complicated by the status of both the individual sensors and their controlling ground stations.



(U) This solved one problem for the operational constellation, but the status of the limited reserve sensors remained a matter for concern. Also, the overall fragility of the operational satellites demanded increased attention to the

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(U) Having verified the requisite procedures during the

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(U) The health of the operational constellation remained surprisingly good throughout 1987, with no significant performance anomalies occurring despite the continual anxious monitoring of each sensor by its ground station. Although the system was performing exceptionally well, the issue of getting a new sensor on station remained a pressing one for the command, for based upon historically validated methods of predicting operational life spans, it was estimated that both Flight 10 and 11 could be expected to experience "end-of-usable life"

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(U) At the close of 1986 the command, Air Staff, and NASA were still discussing possible options for an early launch of Flight 13 in the face of the launch vehicle shortage that had prevailed since the cessation of STS flights in the wake of the Challenger disaster. By early March 1987, Headquarters Space Division in Los Angeles was

requesting Headquarters AFSC to "initiate action with Air Staff to designate DSP as a shuttle launch on need mission with an initial launch capability of mid-CY 88." The message noted stressed that this capability was "urgent" for a variety of reasons.

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without implementing pre-planned STS Launch on Need provisions, the DSP's dual launch capability could not be applied in time to offset the impact of any significant design or test delays that could potentially arise late in the Titan IV development cycle."[16]

The appeal stressed that the proposed Launch on Need option "would be exercised in an emergency condition only, and the mid-CY 88 initial launch capability would represent an achieved capability only--not a scheduled launch position on the current DOD-NASA shuttle mission manifest." This appeal came in the wake of protracted NASA-USAF discussions over the use of "expendable launch vehicles to satisfy several NASA programs," but by mid-March the Air Staff still lacked NASA's "complete requirements to determine if all national security and civil requirements can be satisfied."[17]

While discussions continued with NASA, the command and Space Division forged ahead with plans to put Flight 13 aloft in September via a Titan 34D ELV. That target date was missed,

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Flight 13 finally got off the ground on 28 November when a second Titan took flight from Pad 40 at Cape Canaveral, Florida. It marked the first USAF Titan launch from that facility since 21 December 1984. Although check-out procedures would keep Flight 13 from becoming operational until 1988, the successful launch still represented a big relief to USAF Space Command's missile warning community, for it marked the sole addition to the DSP contingent since the 1985 launch of Flight 12.

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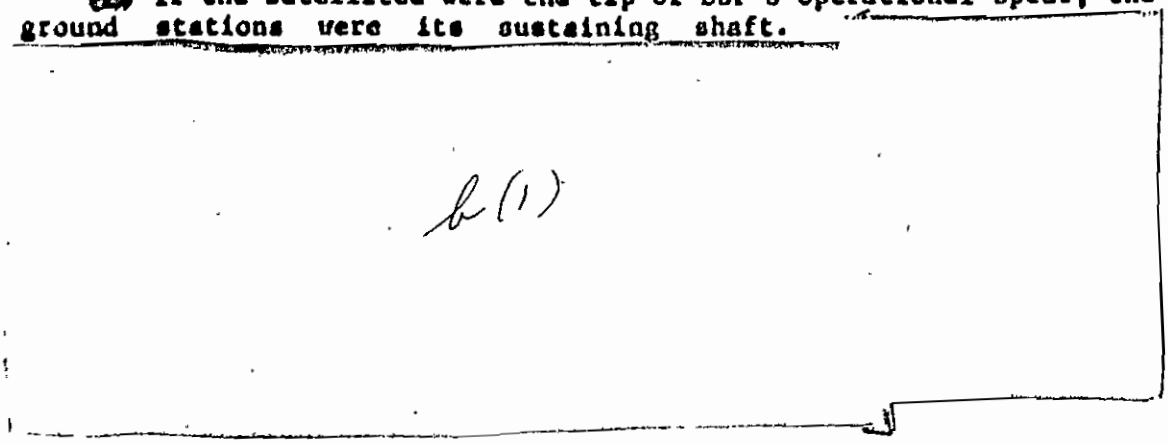
(S) If the satellites were the tip of DSP's operational spear, the ground stations were its sustaining shaft.



(S) 1987 was an eventful year for the ground station network as it maintained a close watch on the sensor constellation, underwent technical upgrades, and weathered the winds of political contention at home and abroad. The OGS aroused sustained interest among both the command and its foreign hosts on several counts. In the early spring the Australian Department of Defence (ADOD) and Minister of Defence issued official statements regarding the evolution of the United States-Australian relationship in the joint management of Nurrangar and other sites in the country. These documents, although uncritical of the American presence and missions in Australia, served as useful background to the discussion engendered by the 21 August release of Dr Desmond Ball's study, A Base for Debate: The US Satellite Station at Nurrangar.[20]

(S) Dr Ball, an articulate critic of the American military presence in Australia, published A Base for Debate as a compilation of information about and a critique of Australia's cooperation with the United States in operating the Joint Defence Space Communications Station (JDSCS) at Nurrangar and the United States DSP system. He concluded in his study that the Americans should be given notice that the facility at Nurrangar must be closed in 1989. This action should be taken because, in his view, DSP did not require an Australian ground station for its operation and because the system's capabilities were "increasingly extending further from the essentially unobjectionable mission of early warning to the support and enhancement of US nuclear war-fighting capabilities." He went on to charge the Australian government with attempting to deceive the citizenry about the true nature of the operations conducted at Nurrangar.[21]

(S) Australian Minister of Defence Beazley responded to Ball's charges in a television interview conducted on the same day as the book's public release, defending both the legitimacy of the OGS mission and the Australian government's role in it. Public interest was further piqued when the Canberra Times published a series of excerpts from the book over the period of 22-24 August. Minister of

Defence Beazley subsequently requested the assistance of the United States Department of Defense in framing an authoritative official response to Ball's charges. Headquarters USAF Space Command DCSs for Plans and Operations were involved in framing the American contribution to the document, which was planned for release to the Australian parliament in September. By that time public interest in the issue had begun to wane, and the Australian press was devoting more coverage to the possible linkage of trade negotiations and the joint defense facilities in negotiations with the United States and the continuing decline of the domestic "Peace" movement than to any sustained discussion of the Ball book. Despite the failure of the book to generate any groundswell of public opinion against the presence of the OGS, the command continued to weigh its options in retaining or discarding the installation as the DSP system evolved.22

(S) The big news at the OGS in 198[illegible] was not the Ball book, but rather the conduct of the Peripheral Upgrade Program (PUP). This technical upgrade replaced the computers, peripherals, display and display scopes at the facility while adding a new Satellite Operations Center.

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The PUP installation began at OGS on 12 April and was certified as completed and operational by the command on 25 September 1987. The upgrade process did have a major impact on the site's daily operations, for it was alloted eight hours a day of downtime for operator/maintainer training and familiarization on the new equipment during the period of the upgrade's installation, testing, and certification. This necessitated the deployment of a Mobile Ground Station to the SPS for an extended period to give that facility a "dual string" capability with which to control and monitor the DSP East sensor while the OGS was inoperative. (See the discussion which follows in this chapter.)23

(S) The Continental Ground Station (CGS) was unique among the family of DSP ground nodes, for not only did it

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This fact necessitated the taking of special precautions to ensure the unimpeded flow of data while the CGS underwent technical upgrading during the year.24

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The CGS was slated to finish testing and certification of the PUP improvements initiated in late 1986, while also preparing for the activation of a commercial power feed to the site and installation of the Solid State Uninterruptible Power System (SSUPS). The PUP project was successfully terminated by 6 June, but by that time the main focus of concern had shifted to preparations for the commercial power/SSUPS upgrade and the operational disruptions that it would inevitably entail.

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Additional periods of downtime were required during the new year, but their impact on DSP operations was minimized due to the data restoral procedures perfected by the CGS.25

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The three permanent, fixed ground stations of the DSP system were complemented by the existence of a contingent of mobile, survivable ground stations which possessed the capability of both augmenting their operations during peacetime and assuring the continued operability of the sensor system in the event of conflict and the destruction of the OGS, SPS, and CGS. Called the Mobile Ground System (MGS), this element of the larger DSP family was

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The MGS had continued its support of CGS operations (begun in 1986 while that facility was undergoing the PUP process) into the new year, providing continuous 24-hour per day support on the Atlantic sensor. There was thus a solid base of practical operational experience to draw from when, on 1 June 1988, United States Space Command tasked Air Force Space Command to support

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operational mission by making it a daily player in supporting CGS operations with both the Atlantic and Pacific sensors. Although the MGS could only acquire, process, and transmit data to the appropriate users (it lacked any control capability over the satellites or the ability to monitor state of health), it still functioned effectively

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(S) Support of the CGS continued at the same time that the MGS was also tasked to support the PUP upgrade at the OGS by deploying a mobile ground station overseas to the

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(S) The MGT complement

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The entire exercise provided tangible proof of the system's utility in executing missions beyond the original scope of its conception.32