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STUDY S-467

THE EVOLUTION OF U.S. STRATEGIC COMMAND AND CONTROL AND WARNING, 1945-1972 (U)

L. Wainstein, *Project Leader*

C. D. Cremeans

J. K. Moriarty

J. Ponturo

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INSTITUTE FOR DEFENSE ANALYSES
INTERNATIONAL AND SOCIAL STUDIES DIVISION
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Canada. One salient feature of the SCC was that any center could perform the direction-center function for any or all of the other sectors within the SCC if necessary. In short, each of the nine hardened SCCs could conduct the detailed air battle anywhere in the country.[25]

(U) ~~(C)~~ The hardened SAGE concept was approved by Headquarters USAF on 5 February 1959. Because of problems involving feasibility of occupancy by the desired dates, however, and lack of agreement on the desired degree of hardness for the centers, a revised OEP was issued on 19 June 1959. This deployment schedule called for the first SCC (the first of 10) to be operational by August 1963. But on 19 June, the Department of Defense also published its Master Air Defense Plan, which was considerably less ambitious. The DoD plan reduced the total program from 10 to 7 hardened sites. After a vigorous ADC and NORAD reclama, DoD placed a hold order on the purchase of all SCC equipment pending an evaluation of the total program.[26]

(U) ~~(C)~~ When the DoD study was completed, about 1 February 1960, DoD recommended that SAGE assume an all-soft configuration, because of the cost of hardening. Once again there was a vigorous ADC-NORAD rebuttal, but the DoD concept prevailed. On 30 March 1960, USAF canceled all Super Combat Centers. Meanwhile, the basic SAGE system was completed in December 1961, when the Sioux City Direction Center became operational. McMullen states: "It was perhaps ironic that SAGE was completed at about the time plans for operating the ground environment following the destruction of SAGE became solid."[27]

D. WARNING OF MISSILE ATTACK

1. Ballistic Missile Early Warning System

(U) With the growing threat in the last years of the decade from Soviet ICBMs, the problem of attaining warning of a missile attack was given high priority. While much of the actual accomplishment in the missile warning program falls in the next period (Part III), most of the planning and a considerable amount of construction took place in the last years of this one. On 14 January 1958, the Secretary of Defense gave initial approval for the construction of the Ballistic Missile Early Warning System (BMEWS) being developed by the Air Force. It was directed that the Thule site be operational in 1959 as a first priority, a site in Alaska as the second priority, and a site in Scotland as the third priority. Interim computer and display facilities at NORAD were to be activated for the Thule station and later expanded to provide capability for the full system. Scanning radars were designated for initial site capability pending development of tracking radars, which would later be installed to supplement the target verification and prediction capability.[28]

(U) ~~(C)~~ On 9 May 1958, after extensive reviews of costs and system designs, the Secretary of Defense directed the Air Force to proceed with the radar stations at Thule and Alaska and a computer and display facility at NORAD. The total cost for this portion of the system was estimated at slightly over $800 million. Authorization to proceed with the station in Scotland was deferred pending negotiations with the United Kingdom for a joint venture.[29]

(U) On 13 October 1958, Headquarters USAF approved the BMEWS final operational plan. The total system would consist of three radar installations, associated rearward communications, and the computation and display facilities in NORAD headquarters. Operational target dates of September 1960 for Thule and September 1961 for Clear, Alaska, were now established.

(U) ~~(C)~~ The program remained in an unsettled state throughout 1958-59, however, largely because of funding difficulties. It became necessary for the Air Force to aim at only a limited operational capability in order to remain reasonably close to the projected target dates. The time of construction of the planned third site, to be located at Fylingdales Moor in the United Kingdom, was also thrown into doubt. By June 1959, after much discussion, DoD confirmed the USAF proposal for an interim BMEWS program to include all three sites and to be carried out in two phases. An interim display facility was approved for installation at the existing NORAD combat center, to be operational in September 1960 and used until the hardened NORAD combat center was completed, possibly in 1963.[30]

(U) (S) On 30 September 1960, the Thule BMEWS site did reach IOC, as scheduled. This constituted a major step toward a warning capability against missiles, since the Thule location covered four sections with a total azimuth scan of 160 degrees. Also in September 1960, work began on installation of a SAC display warning system, with three display consoles to be eventually installed at SAC headquarters. Plans for sending ICBM raid information directly to SAC from the BMEWS site were disapproved by Headquarters USAF, however; instead, SAC would receive data from NORAD.[31]

(U) (S) In the meantime, experience was being gained with the system. On 5 October 1960, moon echoes appeared in one of the Thule fans and were mis-identified as a potential missile threat. However, impact points were not predicted, and both NORAD and SAC treated the alarm as false. Subsequent investigation showed that it was indeed radar echoes from the moon that had caused the false alarm. Improved "gating" procedures --i.e., means of filtering out interference or aurora from a radarscope or system--were later instituted in order to prevent another false moon alarm.[32]

2. Bomb Alarm System

(U) (S) The Bomb Alarm System (BAS) was designed to detect detonations, locate precise blast locations, and indicate the intensity and pattern of attack. The complete system, leased from the Western Union Company, depended upon three optical

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WARNING AND ATTACK ASSESSMENT

(U) ~~(C)~~ The contribution of attack warning systems to the overall US strategic posture underwent important changes in nature and significance during the 1960s, primarily in response to the changing warning environment. The traditional priority function of attack warning--to alert, launch, and control active defense forces--went into decline as the primary threat shifted from manned aircraft to missiles and as anti-missile defenses remained at best a conjectural proposition. The forward bomber warning lines, primarily the elaborate DEW Line constructed at great expense during the 1950s, lost much of their original value when measured against the mixed threats of the 1960s and the likelihood of a shift in enemy bombers to a secondary follow-on attack role. In the absence of strategic defensive systems, the rationale for ballistic missile warning was recast mainly in terms of its contribution to the strategic offensive posture--the posture of deterrence through assured retaliation by strategic offensive forces. Even in this strategic offensive context, the role of warning was further modified by changes that reduced the dependence of retaliatory forces on warning for their survival and enabled them to make more effective use of shorter warning times. In the world of missile threats and missile responses, warning became far more critical for the decision time and flexibility that it might afford to the national command and control structure.[1]

A. THE DEW LINE

(U) ~~(C)~~ The bulk of the DEW Line, developed primarily to detect aircraft in surprise attacks, was beginning to close down by

1963; many of its radars were counted as superfluous and the remainder were maintained as a "tactical holdback line" to deter enemy bomber penetrations until after missiles were detectable, i.e., to delay enemy bombers in a mixed missile-bomber attack for three or four hours. The early warning function itself was assumed by BMEWS, and the remnants of the DEW Line became more tactically oriented toward the antiaircraft surveillance and defense functions of the SAGE system, the Backup Interceptor Control (BUIC) stations, and the projected Airborne Warning and Control System (AWACS).[2]

B. BMEWS

(U) ~~(C)~~ The basic ICBM warning system throughout the 1960s was BMEWS (474L), the system of long-range, ground-based radars covering the northern approaches to the continental United States. Sensors were located in Greenland (Thule), Alaska (Clear), and the United Kingdom (Fylingdales Moor), with Thule first operational in September 1960, Clear in June 1961, and Fylingdales in January 1964. Capable of detecting ICBMs out to a range of some 3,000 miles, BMEWS could provide close to 15 minutes minimum warning, together with a rough count of the number of warheads and their approximate impact time and area, directly to NORAD headquarters and immediately thence to warning displays at the NMCC, ANMCC, and SAC as prime users.

(U) ~~(S)~~ Warning from BMEWS was critical to the survival of the bomber force, which depended on airborne escape (rather than concealment, mobility, hardening, or other forms of protection), and the 15-minute BMEWS warning time became the standard for ground alert aircraft at SAC. In the early 1960s, when SAC kept half the B-52 force on so-called 15-minute ground alert, it could launch as many as 14 percent of the alert aircraft within 8 minutes, from a "normal" (for SAC) DEFCON 4 posture, and as many as 43 percent from a higher DEFCON 2 posture. It could also launch the entire alert force in as little as 11 minutes, with a single minute in the peak phase allowing as many as 200 aircraft to become airborne.[3] During the years when manned aircraft were by far the predominant element in the retaliatory force, this potential warning contribution was invaluable: it could promise a second-strike capability even by this otherwise relatively soft and vulnerable weapons system.

(U) (C) Warning from BMEWS also enabled SAC to exploit the unique capability of bombers to launch under positive control, even in ambiguous or equivocal circumstances, without precommitment to strike--a "launch-on-warning" and recall option that was not available in the case of missiles. Warning could provide useful time in which to count down missiles to minimum holds and shorten their reaction times, but it did not add the option of a contingent launch. Warning enhanced the capabilities of manned bombers, therefore, and the continued utility of bombers in the strategic force was directly linked to the continued effectiveness of warning support.[4]

(U) (C) For a short period in the early 1960s, there was some inclination to judge the criticality of BMEWS and the worth of other early warning systems primarily in terms of bomber survival. The 15-minute ground alert posture for bombers was apparently considered at first as a stopgap measure until the retaliatory forces could be restructured around missiles (like Polaris and Minuteman) that did not depend so heavily on warning and quick reaction and could therefore "ride out" an attack.[5] In the same way and for the same reason, as the relative proportion of bombers in the strike force declined, it was expected that the relative value of warning systems might also decline.[6] Bombers remained a very substantial portion of the strike forces throughout the 1960s, however, as the JCS counseled from the beginning. (Although the JCS did not use the word "triad" at the time, they consistently defended the continued need for manned bombers in the strategic mix.[7]) In 1968, manned bombers, mostly B-52s except for a small number of B-58s, still constituted some 945 of the 2,650 major strategic offensive delivery systems in the operational forces, more than one-third of the strategic triad, for which even short warning times were of vital importance.[8]

(U) ~~(S)~~ Moreover, as the JCS also argued on many occasions, warning was a requirement not only for the protection of strike forces but also to provide maximum opportunity to formulate an appropriate "national reaction," that is, for decisions.[9] The utility of warning to support the command and control process was increasingly emphasized during the 1960s, even after its contributions to the protection of population and industry were virtually dismissed and those to retaliatory force survival were considerably downgraded.

(U) ~~(S)~~ As a comprehensive warning system against missile attack, BMEWS had serious shortcomings, primarily in geographic coverage and in the amount, quality, and timeliness of the information that it provided. It could be deliberately spoofed, blacked out, or attacked, of course, but such events could be treated as potential indicators of attack and could easily interfere with surprise. It could be bypassed, at less potential cost and risk, by extended-range or low-angle ICBMs, for example, by SLBMs, or even (as the Soviets showed when they began testing the capability in the late 1960s) by orbital systems.[10] Minor improvements in BMEWS coverage and effectiveness were made during the 1960s, naturally, but more was required. It proved necessary to augment BMEWS with additional warning systems and to adopt a multiple approach to the missile warning problem. None of the other systems became a full-fledged alternate or successor to BMEWS, and in fact none of them even came into operation until the late 1960s and early 1970s, but they were largely developed during the 1960s, together with BMEWS, into the interlinked warning network of the subsequent 1970s.

C. SLBM WARNING

(U) (C) Clearly, BMEWS required augmentation against SLBMs, which could be launched from positions off US coasts and on trajectories that BMEWS was not designed to detect. Soviet SLBMs in the early 1960s were relatively short-range (350-mile) systems, three per submarine, that had to be fired from the surface, but the Soviets were actively developing newer classes of longer range submerged-launch systems, like Polaris, that could pose an even greater threat by the late 1960s and 1970s.[11] In a surprise attack context, the Navy's underwater sound surveillance (SOSUS) and other ASW systems could presumably deter a sudden large buildup of SLBM submarines in potential launch areas prior to attack, because of the risk of premature detection, but it would not be difficult for limited numbers of prudently operated enemy submarines to penetrate such defenses and to launch missiles without warning.[12] The SLBMs therefore constituted a dangerous threat of no-warning attack against such critical, early targets as fixed command and control centers, communications facilities, and SAC bases--much like the Cuba-based MRBM-IRBM weapons that also would have avoided the BMEWS system.

(U) (S) The specialized system developed to counter the missile threat during the 1960s was the SLBM Detection and Warning System (474N), a complex of eight modified long-range SAGE radars deployed along the east and west coasts. Built as an interim system, it was capable of monitoring coastal approaches out to about 750 n.m. and providing three-to-seven minutes warning of SLBM strikes, depending on the location of launching submarines, together with limited trajectory measurements. As with other warning systems, data were analyzed by computer and forwarded to the NMCC, ANMCC, SAC, NORAD, and other direct users. The system was partially operational in the last half of the 1960s, but it did not achieve full operational status until 1971, at which time newer systems were under development to provide even more reliable warning against even longer range Soviet submarines.[13]

D. OVER-THE-HORIZON RADAR

(U) ~~(S)~~ Another ground-based missile detection system that remained under development during the 1960s, but emerged as a successful backup and extension of BMEWS in the late 1960s (until retired in 1974), was the Over-the-Horizon (Forward-Scatter) Radar (440-L). Not really a radar, the 440-L system consisted of a series of high frequency radio transmitters and receivers at various locations in the Far East and Europe, on either side of the Soviet-Chinese landmass. Continuous signals from the transmitters were bounced off the ionosphere and then repeatedly back and forth between the ionosphere and the surface of the earth until they reached the receiving stations. There the receivers detected perturbations or disturbances of the transmissions caused by missiles penetrating the ionosphere under active-boost propulsion. The system provided nearly real-time (five-to-seven minutes from launch) detection of missiles launched from the USSR and China (also satellite launches and nuclear detonations), with time-of-launch and rough estimates of the launch location and type and number of missiles. Data from the receivers were correlated in Europe, transmitted to NORAD for processing, and sent to the NMCC, ANMCC, and SAC.[14]

(U) ~~(S)~~ The 440-L system had the advantage over BMEWS of being an omnidirectional system that was able to detect missiles (such as FOBS) intended to end-run BMEWS. In 1966 and 1967, it demonstrated a high-order capability by successfully detecting and reporting 94 percent of all Soviet ICBM test launches (198 of 210), including all 10 FOBS tested in 1967, and plans were accelerated to introduce it as a working system. It became operational in 1968.[15]

E. DEFENSE SUPPORT PROGRAM

(U) (S) The newest and most sophisticated addition to the missile warning network was the satellite-based, infrared-detecting surveillance and warning system presently known as the Defense Support Program (DSP). It was an outgrowth of over a decade of experimental R&D, first with the Missile Defense Alarm System (MIDAS) of the late 1950s and early 1960s and then with the highly sensitive (and controversial) follow-on Programs 461, 949, and more recently 647--a series of technologically difficult, expensive, and for many years operationally uncertain efforts to develop an orbital infrared detection system that could detect missiles in the powered-launch phase. It remained a developmental and demonstration effort until 1971, when the first operational satellite was orbited.[16]

(U) (S) Although it was many years in reaching fruition, satellite-based infrared detection promised the earliest possible warning of missile attacks, within minutes of launch, extending potential warning time for north polar ICBMs from the 15 minutes of BMEWS to perhaps 27 minutes; providing improved and more flexible coverage than BMEWS, including coverage of SLBMs, FOBS, or other circumventing systems; increasing the credibility of other warning sensors by adding correlative evidence, confirmatory or not, from an alternative system; and adding to the accuracy and reliability of information as to the source, magnitude, and, with tracking, the nature of an attack. Although the program was beset with serious reliability and cost problems and pushed hard at the limits of infrared-descrimination and other technologies, it continued to attract strong support throughout the 1960s.[17]

(U) (S) One of the strong underlying themes in the arguments supporting the various precursors of the DSP, and one that illuminates an important strategic command and control issue of the 1960s, concerned its utility not merely for attack warning but also for attack assessment. The system was important, perhaps even more than other systems, for providing time for decisionmakers to take measures for survival, including possibly relocation to the NEACP or elsewhere; it could provide extra time for them to perform essential retaliatory command functions, including more opportunity to ascertain the situation and consider desirable alternatives. By providing usable warning time, the system was also important for enabling the strike forces to undertake precautionary or other actions that might be vital to the effectiveness of any response.

(U) ~~(S)~~ Time alone, even minutes, was considered of crucial significance for such purposes.[18] But the DSP-type systems held out hopes for even more. They promised more information, better information, more accurate and reliable information, and timelier information as to the source, magnitude, and objectives of an attack; as to whether one or a few weapons impacts were accidental, or the first of a salvo; whether it was a controlled or indiscriminate attack; whether it was an attack directed against military targets, population centers, or both; whether it was an attack that included or excluded governmental control centers; and so on. The systems promised, in short, to improve the capability to assess an attack and even evaluate the likely intentions of an attacker, and to do so by a wide margin over other warning and surveillance systems.[19]

(U) ~~(TS)~~ Even with BMEWS and 440-L, exercises showed, national authorities were required to make retaliatory decisions in the absence of any real knowledge of the nature of an attack--at best in the knowledge only that some more or less large number of warheads was en route to the United States, a rough approximation of their impact times and areas, and perhaps a crude estimate of the country of origin.[20] This was hardly the quantity and quality of information required for a choice among the flexible response options desired by decisionmakers. It was hardly sufficient for the decisions called for in the *SIOP Decision Handbook* prepared by the JCS for the President, the

Vice President, the Secretary of Defense, the CINCs (and themselves): Whether to execute and if so--to execute strikes against nuclear threat targets only, against nuclear threat plus other military targets, or against nuclear threat plus other military plus urban-industrial targets of a country? To execute or withhold strikes against the Soviet Union, China, or other individual Communist countries? To execute or withhold strikes against military and government controls in the Moscow area? To execute or withhold strikes against nuclear delivery and storage sites in China? To execute or withhold strikes against military-government control targets in the Peking area?[21]

(U) ~~(S)~~ The DSP-type systems promised, for the first time--nearly a decade after programs were initiated to develop sufficiently flexible strategic forces and sufficiently flexible command and control systems, and a sufficiently flexible SIOP war plan--to make flexible response options more than a remote possibility. This was their chief attraction during the 1960s, far more than the extra minutes of warning time alone, and it continued to be their chief attraction as they came into operation during the 1970s. Not warning alone, but warning time and attack assessment, became the keys to strategic flexibility.

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XXXIII

THE COMMAND POST PROBLEM

(U) The idea of hardening command posts, including those from which the National Command Authorities would operate in wartime, had been greatly stimulated by the advent of nuclear warfare. In time, the capabilities of the new weapons made the hardening process only marginally effective, but it proved difficult for those responsible for the command centers to acknowledge this. Despite what was known about the power of nuclear weapons, it continued to seem prudent to provide a certain amount of protective hardening for national command posts.

(U) For a time at least, the high CEPs of nuclear weapons did make a hardened command post seem sensible. It became increasingly controversial, however, as to whether a hardened command post at the seat of government could possibly be large enough to accommodate the men, records, machines, and so on that made the capital a desirable place from which to conduct business in the first place. The use of alternate sites was devised to give the National Command Authorities options and to introduce uncertainty into the calculations of an enemy. Alternate command posts inherently provided a certain element of redundancy, and this advantage was extended by the conscious development of different communications systems, not only so that there would be alternates in the event one or more were destroyed but also to take advantage of the prospect that one might function under circumstances in which others would not.

(U) The ANMCC at Fort Ritchie had the advantage of a degree of hardness and a great deal more space and more extensive facilities than the command posts in the air and on the

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than the AABNCPs. No one could bring himself to abandon the facility, though in 1969 the Deputy Secretary of Defense ordered that it go on standby--for reasons of economy.[2] The Chairman of the Joint Chiefs found this recommendation difficult to accept and argued against it.[3] Fort Ritchie remained, however, only an alternate--and not a very likely one.

(U) (TS) Another choice offered the NCA as an alternate command post in the sixties was the NECPA. The command post afloat had the advantage of space--less than that of the ANMCC but greater than the ABNCP--and of endurance--again less than the ANMCC but much greater than that of the ABNCP. Even in the Navy, however, it was generally felt that the location of the ships in Chesapeake Bay so as to be easily available from Washington, and their slow speed, made it very unlikely that they could avoid surveillance and destruction by a vigilant opponent. One of the two ships was taken out of commission in 1969 and the other shortly after.

(U) The airborne command post offered the most appealing alternative to the NMCC in the view of the majority. Because of its maneuverability, it had a relatively high chance of survival while airborne, and it could be brought to a place quite near the NCA in time of emergency, even follow the President on journeys away from Washington. Its capabilities were, of course, limited by its relatively small size, but with technological improvements, its capabilities increased.

(U) In the late sixties, a proposal had been made for substantially expanding the capabilities of the airborne command post by using one of the large airframes that were then coming into commercial and military use. The Boeing 747 soon became the most likely candidate and there followed long discussions of the arrangement and of the facilities to be provided for what was to be designated the AABNCP. Differences of view were not quickly resolved for they centered on questions as to cost, mission, what facilities should be included, than the AABNCPs. No one could bring himself to abandon the facility, though in 1969 the Deputy Secretary of Defense ordered that it go on standby--for reasons of economy.[2] The Chairman of the Joint Chiefs found this recommendation difficult to accept and argued against it.[3] Fort Ritchie remained, however, only an alternate--and not a very likely one.

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(U) (~~TS~~) An example of basic differences that persisted, or were thought to persist, was a charge made by the Chairman of the Joint Chiefs against the DDR&E in a memorandum for the Secretary of Defense. The Chairman said:

> There is some indication that the lack of progress [by DDR&E] may be attributable, in part, to confusion over the role of the ABNCP. The issue is whether the current ABNCP system should be maintained simply to provide a capability for inflexible execution of a single SIOP task, or whether an AABNCP should be created to provide a capability for assessing the attack situation and for flexible execution of SIOP tasks.

The Chairman said that the former capability was already provided by the current system of EC-135s, and that the latter capability could only be provided by the AABNCP. In fact, it turned out that there was no difference between the JCS and DDR&E on this matter, despite suspicions.[4] It was, however, indeed this new and complex idea of a completely new function for the command post that made the decision on the AABNCP so difficult. Many people continued to wonder if even the AABNCP was big enough, survivable enough, and had enough endurance--after all, it could stay in the air only for a matter of hours and depended on supporting bases to get into the air again. On 17 December 1971, the new WWMCCS Council chose the faster of two options which would put seven 747 AABNCPs in the air in 1975.[5]

(U) (~~C~~) Throughout consideration of this issue, it was Deputy Secretary Packard's position that there should be a strong and well-equipped NEACP operating out of Washington. He felt that the NCA should have a capability comparable to that of SAC and

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should not have to depend on the SAC airborne command post, LOOKING GLASS.

(U) (S) The question of the survivability of AABNCPs had not been resolved, however. On 26 April 1972, WSEG Report 179 appeared. It identified the following vulnerabilities in the ABNCPs:

> (1) Under current conditions, ABNCPs are vulnerable to SLBM attack. They are under 15-minute ground alert, but all bases are within 13.8 minutes flight time of potential SS-N-6 launch locations.
>
> (2) The unique electromagnetic transmission of ABNCPs could be used for terminal homing of enemy aircraft.
>
> (3) Lack of air defense coverage in south-central CONUS could permit an enemy aircraft to get through undetected.
>
> (4) The relatively small emergency wartime orbit of LOOKING GLASS might appear attractive for a barrage missile attack.
>
> (5) Present procedures for LANTCOM's TACAMO aircraft make them highly vulnerable to tracking.
>
> (6) Current HF-LF-VLF radio communications linking ABNCPs within CONUS to overseas WWABNCPs are not reliable in a nuclear environment.[6]

The AABNCPs on order were expected to correct some but by no means all of the vulnerabilities listed in the WSEG report.

(U) (TS) Even if the provision of alternate command posts and of redundant communications had provided a more hopeful outlook for survivability, there would have remained the more basic problem of getting the President to one of them and getting his decisions to the strategic forces after he was there. The communications problem is highlighted by the conclusion reached by DDR&E about the value of a Deep Underground Command Center (DUCC), one so deep underground that it could survive hits by the USSR's largest weapons. The conclusion was: "the utility of a DUCC is limited by the possibilities for equally survivable communications" and these are simply not realistically available.[7] The problem had been

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