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SEMI-ANNUAL HISTORICAL REPORT
1 July - 31 December 1952

NARRATIVE

Prepared by
THE DIRECTORATE OF HISTORICAL SERVICES
OFFICE OF THE COMMAND ADJUTANT

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PREFACE

This is the fourth Semi-Annual Historical Report prepared by the Headquarters Air Defense Command Historical Office for submission to the USAF Historical Division. It was written in compliance with the very general instructions contained in Air Force Regulation 210-3.

The first such report (ADCHR #1) related the major developments in the growth of a continental air defense system in the post-World War II years prior to the establishment of the present Air Defense Command on 1 January 1951 and in the first six months of the command's existence. The second report (ADCHR #2) continued that story through December 1951 in as complete a manner as possible within the then extremely limited personnel resources of the Historical Office. The third report (ADCHR #3) brought the story to date through June 1952. The present report (ADCHR #4) treats of the major developments in air defense from July through December 1952.

In this work, Mr. Denys Velan wrote the chapter on Surveillance and the chapters on the Mobile Radar Program and the seaward extension of the radar system. Mr. William R. Hochman prepared the chapters on manpower and organization. Mr. Lydus H. Buss wrote the chapter on the Weapons. Technical Sergeant William M. Draper, Historical Technician, collaborated with Mr. Velan on the preparation of the Ground Observer Corps chapter. Editorial responsibility was assumed by the undersigned. Mrs. Betty Terry typed the manuscript. Technical Sergeant Draper, A/2C Richard Carnes, A/2C Robert Loy, and A/1C Robert Rusnock took charge of the security and reproduction details incident to the preparation of the volumes of supporting documents.

Colorado Springs
31 August 1953

Thomas A. Sturm
Director of Historical Services

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REFERENCE NOTE

Footnotes are numbered consecutively within each chapter. Supporting documents are numbered consecutively throughout the volume.

The following abbreviations have been used in the footnotes. ADCHR #1, #2, and #3 refer to previously published Air Defense Command semi-annual historical reports, as explained in the preface. Copies of these reports are on file in the Historical Archives at the USAF Historical Division, Maxwell Air Force Base, and at Headquarters, Air Defense Command. The abbreviation HRF indicates that the document is in the Historical Reference Files at Headquarters, Air Defense Command.

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PART I

OPERATIONS

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CHAPTER ONE

SURVEILLANCE

I

Ever since 1948, when the United States Air Force first began a concerted effort to erect a surveillance network in the continental United States to detect hostile aircraft penetrating the borders of this country, the progress of surveillance capability had been continuous.[1] In the years between 1948 and 1952, the Continental Air Command and its successor, the present Air Defense Command, deployed a quantity of World War II-type radar equipment in an attempt to provide a surveillance capability where none had existed previously, and also undertook, at the same time, to erect a network of 75 "permanent-type" radar stations equipped with more modern post-war search and height-finding radars. In addition to this electronic network, efforts were made during this period to organize a network of civilian observers, known as the Ground Observer Corps, whose mission it would be to detect aircraft which were beyond the capabilities of the ground radars to detect, and also which was to provide a surveillance capability in areas which were not covered by radar.[2]

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1. The story of the development of a surveillance capability since the end of World War II has been told in the preceding semi-annual histories of the Headquarters, Air Defense Command. See ADCHR #1, pp. 30-115, 251-288, 360-371; ADCHR #2, pp. 11-44; ADCHR #3, 1-58, 194-217.

2. For the history of the GOC to June 1952, see ADCHR #1, pp. 251-287; ADCHR #2, pp. 27-35; ADCHR #3, pp. 261-296.

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During 1951 and 1952, as the more modern permanent-type stations were completed and their new search and height-finding radars installed, the older-type, or Lashup, radar stations and their equipment were gradually withdrawn from the air defense system.[3] The effect of this gradual changeover from old to new radar equipment was marked. The new-type search radars: the AN/FPS-3 and the AN/CPS-6B, possessed greater ranges than the older AN/CPS-1, AN/CPS-5 and AN/TPS-1B equipment, and were also capable of more reliable and prolonged operation than their predecessors.[4] During the last six months of 1952, nine "P" radars were added to the surveillance network -- in effect completing the substitution of the permanent-type radars for the old Lashup equipment.[5]

Although the 75 stations of the Permanent system were operating by the end of 1952, certain vestiges of the older Lashup system remained. Of the 81 search radars operating continuously in the surveillance network in December 1952, six were of the older World War II variety.[6]

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3. See ADCHR #3, pp. 10-18.

4. For a comparison of the effective ranges of the ground radars mentioned in the text, see RADC, Technical Report 52-22, 1 Nov 1952, HRF B207.

5. The new radars were located as follows: P-7 (Gonzales, New Mexico, FPS-3); P-8 (El Vado, New Mexico, FPS-3); P-51 (Moriarty, New Mexico, FPS-3); P-18 (Moulton, Minnesota, FPS-3); P-61 (Port Austin, Michigan, FPS-3); P-19 (Antigo, Wisconsin, FPS-3); P-68 (Fordland, Missouri, FPS-3); P-42 (Cross Mtn, Tennessee, FPS-10); P-80 (Caswell, Maine, FPS-10). By December 1952, only one permanent-type search radar remained uninstalled -- at P-16 (Keewenaw, Michigan, FPS-3), but the station was operational, using an AN/CPS-5 radar for the time being.

6. See map, "Types of Search Radar in Operation, Dec 1952," which follows.

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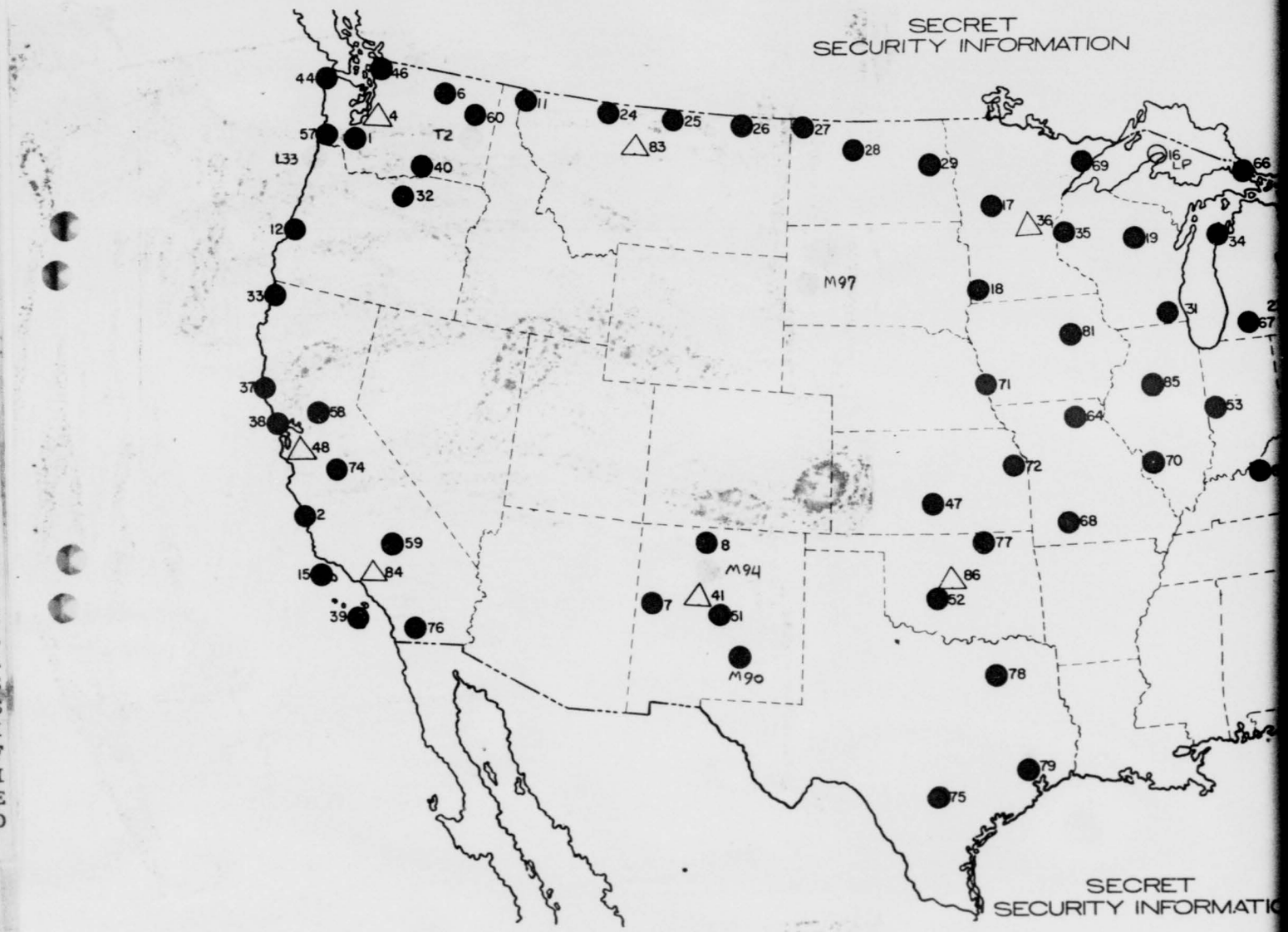

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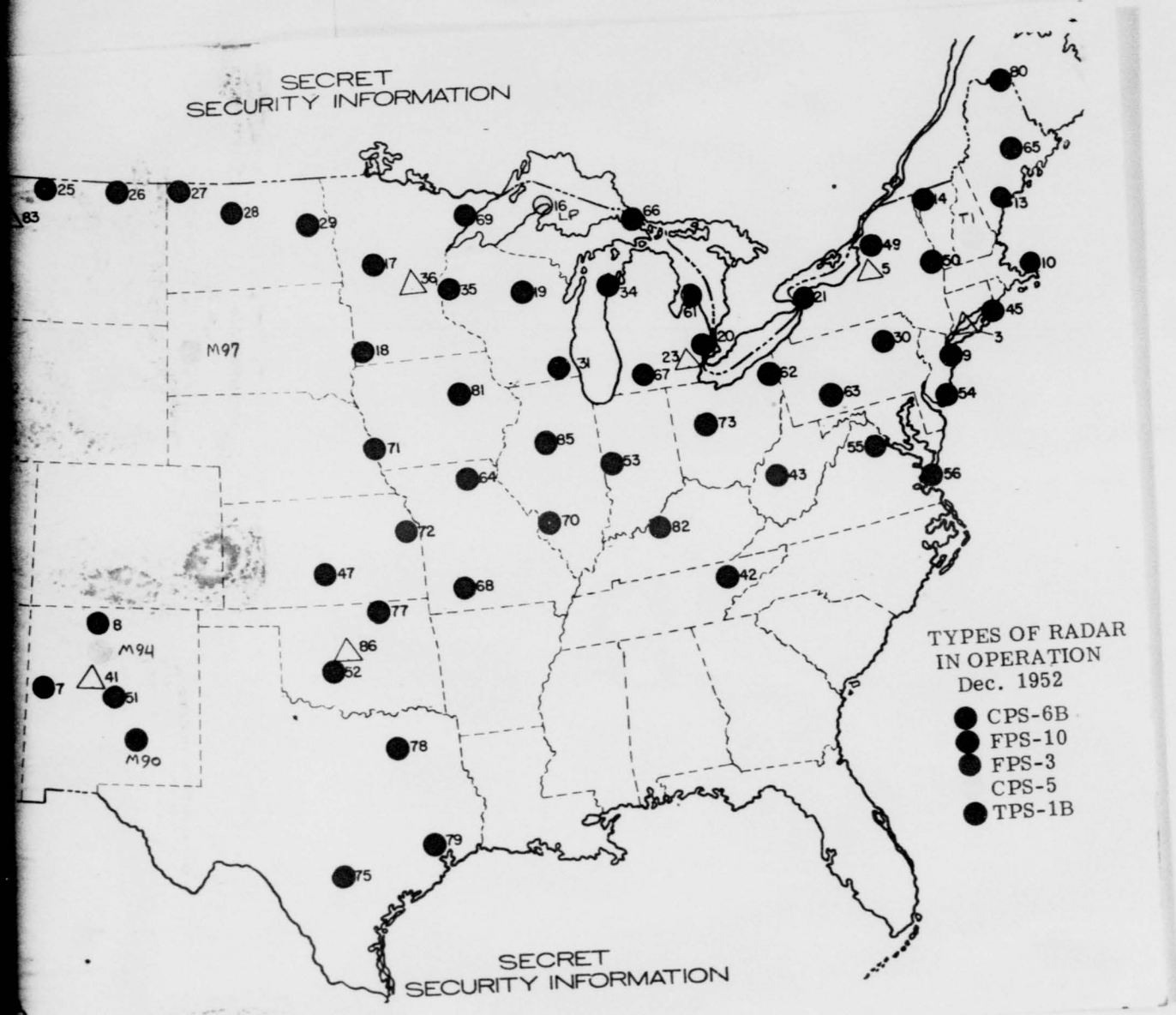

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Five of these radars were required by ADC to close certain gaps in the radar coverage which were not provided for by the 75 new sites, and one CPS-5, at LP-16 (Keewenaw, Michigan) was operating pending installation of the new FPS-3 at that site.

In addition to the installation of nine new radars during the last six months of 1952, another action which enhanced surveillance capability concerned the operation of the Ground Observer Corps. In July, ADC developed and proceeded to implement a new operational concept affecting the GOC, as a practical measure to improve the capability of the air defense system in low-altitude detection and tracking.[7] This new concept, implemented as a permanent operational condition known as Operation SKYWATCH, was based on the premise that a standby low-altitude detection capability was inadequate, and that a full-time capability was indispensable. Because of the inherent limitations of ground radar at low altitudes, very low-altitude surveillance had to be performed by human eyes. Consequently, efforts were begun to place the ground observer posts in the western, northern and eastern perimeters of the continental United States on a 24-hour operational basis. Existing GOC posts in the hinterland were to operate as they had been -- on a standby basis. By the end of the year, though obstacles in the inducement of volunteers to enroll in the GOC posts on a 24-hour basis threatened to delay the implementation of Operation SKYWATCH, there were indications, nevertheless, that the GOC was performing its mission

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7. ARCHR #3, p. 270 ff.; also see the chapter on the GOC in the present history.

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much more effectively under the new operational concept than it had been heretofore. The enhancement of ADC's low-altitude capability through Operation SKYWATCH was one of the important milestones in the continuous increase of surveillance capability through the years -- even though ADC remained continuously on the alert to replace or supplement the GOC with an automatic means of low-altitude detection.

By the end of 1952, the facilities employed by ADC to detect intruding aircraft consisted of 81 search radars, 50 height-finding radars and the GOC posts with their associated filter centers. The surveillance potential reflected by the existence of the above-mentioned facilities embraced considerable areas of the continental United States. From southern California, the electronic network progressed northward along the Pacific Coast to the state of Washington, and from there along the entire length of the Canadian border to the state of Maine, and from that point southward along the Atlantic Coast to North Carolina. In the hinterland of the United States, radars were interspersed throughout the northeastern segment of the country in an area inclosed by a line drawn from Minnesota to Missouri and from that point to the Atlantic seaboard in North Carolina. As a consequence of the even spacing of the radars in this important area, continuous coverage was afforded throughout this region at altitudes from 10,000 to 30,000 feet.

Contiguous to this northeastern concentration of radar coverage was a tail-like projection of radars starting in Missouri and extending through Kansas, Oklahoma and Texas. In addition to the belt of radar stations around the perimeters of the United States and through the

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northeast and south central portions described above, there were, in December 1952, two isolated areas of radar coverage in the interior of the United States: one in New Mexico, where five radar stations afforded coverage to the important AEC, SAC and air defense installations distributed throughout the state; and the other in South Dakota, where a solitary AN/CPS-5 radar afforded high altitude protection to the SAC air base at Rapid City. The deployment of the Ground Observer Corps "SKYWATCH area," i.e., those posts operating on the 24-hour schedule, coincided to a great extent with the deployment of the electronic network. The SKYWATCH area extended around the perimeter of the country from California northward and eastward, terminating on the Atlantic seaboard south of Virginia.[8]

II

The deployment of detection facilities which has been described above left many large areas in the continental United States unprovided with radar coverage. West of the Mississippi River an extensive area behind the western and northern perimeters of the country was devoid of either electronic or GOC detection potential. In the southeastern part of the United States, in an area including parts or all of the states of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Tennessee, Kentucky, Missouri, Oklahoma and Texas, no ADC-operated radar protection was afforded.

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8. For a map of the GOC SKYWATCH areas, see ADCHR #3, Map 24.

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Although continuous radar coverage had been provided for the western, northern, and portions of the eastern frontiers of the United States, there were still important segments of the southern border and the southeastern Atlantic seacoast which contained no radar defense against a penetration of hostile aircraft. For example, it was possible for a raid to proceed southward from the Arctic regions through the Pacific Ocean adjoining the West Coast of the United States, and then, on reaching Baja California, to turn sharply northeastward through Arizona into the vast radarless area described previously. Similarly, an attack progressing in a northeastern direction through Mexico would find no radar screen along most of the Texas-Mexico border. Except for some high-altitude protection along the Texas shore of the Gulf of Mexico, undetected penetration was possible through Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, and portions of North Carolina.

The lack of radar coverage in the areas mentioned in the preceding paragraphs did not constitute an oversight on the part of the Air Force. Rather, the implementation of the program to provide the United States with a surveillance capability had been gradual, and the status of that capability in December 1952 represented a stage in the continuous progress of a program envisaged to provide the United States with an ever-increasing surveillance capability.

Originally concentrated in four key target areas, located in the Pacific Northwest, in California, in New Mexico, and in the Northeast,

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the deployment of radars had been gradually extended from these initial areas into adjoining areas. There appears to be some basis for concluding that the original plan, established in 1947 and 1948, was based upon the premise of a widespread coverage of the nation from coast to coast, omitting very few areas from radar coverage.[9] As time went on, however, and the equipment was not forthcoming as quickly as had been anticipated in the earliest plans, a calculated risk was taken, perforce, by both ADC and Headquarters USAF, to concentrate what radar resources were immediately available, and would become available in the near future, into those areas which were most vital to a national war effort. As has been described in the preceding history of the Air Defense Command, in January 1952 ADC determined upon a strategy of deployment for the future, both of radar and fighter resources, which took into consideration the realistic developments just mentioned.[10] This concept of deployment, commonly known as the "double perimeter" concept, assumed that insufficient quantities of radar equipment, funds and personnel would be available in the foreseeable future to insure a complete coverage of the continental area. Under this assumption, therefore, ADC determined that three areas of the continental United States were so vital to any war effort, that the bulk of air defense resources, including radar, would best be utilized to defend those areas. These vital areas were: the vast northeastern segment of the United States which included such

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9. See ADCHR #1, pp. 55-58.

10. See ADCHR #3, pp. 31-36.

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targets as New York, Washington, Cleveland, Detroit, and Chicago; the Pacific Northwest, almost entirely included within the state of Washington and which contained important industrial population defense and AEC installations; and the San Francisco-Los Angeles-San Diego area in California.

It must be noted, however, that the concentration of resources in these areas did not mean that all other regions were to be left unguarded. On the contrary, provision was made for a single line of radars joining the "double perimeter" areas in California to those in the Northwest, and the latter area to the Northeast along the northern border. Provision was also made for certain isolated target areas well within the hinterland, i.e., those in South Dakota and New Mexico described above.

In 1952, therefore, the double perimeter concept was one of the fundamental principles upon which the distribution of radar equipment within the Zone of the Interior was based. Though the principle did not affect the actual radar coverage of the nation in December 1952, it promised to be of paramount significance in determining the distribution of radar equipment in months to come.

III

It has been mentioned that ground radars possessed inherent limitations at low altitudes. The reason for these limitations was the inability of the radar beams to follow the curvature of the earth, i.e., they were restricted to a "line-of-sight" course. The average

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line-of sight of a radar located at sea level was somewhat short of twenty miles. Therefore, in order to insure an electronic radar coverage which would not reveal any gaps in low altitudes, it would be necessary to space ground radars approximately 40 miles from each other. This was a remedy which was, under the austere economies prevailing in 1952, impractical. ADC's radars, according to the principle of the double perimeter, were to be spaced approximately 120 miles apart, thus guaranteeing a gap at low altitudes between the radars currently in use -- unless these gaps were plugged by some other means.

The existence of gaps at altitudes below 10,000 feet was a notorious deficiency of the AC&W system -- in fact, intelligence estimates warned that the enemy would in all likelihood take advantage of this known deficiency by staging a low-altitude attack.[11] A number of possibilities directed at closing the low-altitude gaps were considered by ADC from time to time. Among these were: the concentration of the 24-hour operational GOC posts in areas where gaps existed; the utilization of a large number of small radar sets which could be manned by a minimum of personnel; and the establishment of a screen of "bell-ringing" devices which would, by remote control, alert an air defense installation if an intruder should penetrate the electronic screen radiated by these devices. Though USAF had been alerted by ADC as to the urgency of closing these important low-altitude gaps, by the end of 1952 no single solution had been adopted. Research and develop-

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11. See ADCHR #3, p. 27.

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ment had begun on the creation of a special low-altitude radar set and "bell-ringing" devices, but by the end of the period progress had not as yet reached a point where a definite choice among the solutions could be made.

The average range of the ground radars employed in the air defense system was approximately 120 miles at a target altitude of 30,000 feet. When the target appeared at 5,000 feet, however, the effective range of the search radars was slashed by 50% -- to 60 miles on the average. At altitudes below 5,000 feet, the radar coverage of these same radars decreased proportionately down to "line-of-sight" (approximately 20 miles, depending on siting). In spite of the uniform deficiency of the ground radars at these low altitudes, and the general resignation of the Air Defense Command to the fact that this deficiency was bound to remain until some unforeseeable time to come, there were certain areas in the United States which were so strategically significant that extraordinary means had to be taken to close the gaps in the radar coverage which appeared therein. Thus, between sites P-57 and P-12 in the Pacific Northwest, an alarming low-altitude gap existed which made it possible for an intruder to penetrate the coastal area near Portland, Oregon without being detected, and then proceed to wreak damage upon the important Seattle-Hanford area. Similarly, farther to the south, in the Monterey Bay area near San Francisco, a gap existed which exposed the latter city to an undetected attack. Although other important gaps existed in the western region at low altitudes, nevertheless Headquarters WADF singled these two out for

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special treatment. ADC was requested to permit the retention of a Lashup station (L-33), employing an AN/CPS-5 radar, near Portland, Oregon to close the first of the two gaps mentioned, and also was requested to erect a Lashup station at Fort Ord, south of San Francisco, to close the Monterey Bay gap.[12] Both requests were granted by ADC, though the site at Fort Ord did not become operational until well into the following year.

In July 1952, as a result of observations made during the annual air defense exercise (Operation SIGN POST), the necessity was noted of insuring low-altitude coverage in the Hudson and St. Lawrence River valleys, considered to be natural highways for low-level penetration.[13] By the end of the year, however, no action had been taken on this recommendation, primarily because of the physical impossibility of closing all of the many important gaps which were noted at various times. The painful truth of the matter was that no matter where the enemy chose to enter the air defense system, he could do so with impunity if he flew at low altitudes. Between the enemy and his target only the GOC promised a possibility of detection -- and ADC viewed this safeguard as uncertain in its value.

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12. 28th AD to WADF, "Request for Additional Radar Site," 23 Aug 1952 and Ind, (Doc 1); WADF to ADC, "Request for Interim Gap Filler Site," 7 Nov 1952, and Ind, (Doc 2); Msg, ADC to USAF, 23 Dec 1952, (Doc 3).

13. ADC's annual command-wide exercises have been excellent sources for a study of the actual defense capability of the air defense system, including surveillance. Operation SIGN POST may be followed in: Hq ADC, Operation SIGN POST, 24-28 July 1952, Final Report, 12 Sep 1952; (Doc 4); Hq RCAF, ADC, Interim Report on Air Defense Exercise SIGN POST, n.d., HRF 709; Hq SAC Operation CHECKOUT, Final Report, 10 Oct 1952, in AGC File; Hq AA Command, Report on Exercise SIGN POST, 10 Nov 1952, in AGC File.

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At altitudes higher than 30,000 feet adequate tests of radar coverage had not been performed to ADC's satisfaction, primarily because of the difficulty in obtaining high-flying bombers for test purposes. During Operation SIGN POST it was observed that at altitudes higher than 30,000 feet the ability of the ground radars to detect aircraft was considerably less than at the medium altitudes. This was a deficiency which obviously required immediate correction. The extent of this correction, however, depended on the extent of the vulnerability of the radar screen at these very high altitudes -- a piece of information which was not entirely available to ADC. ADC determined to rectify this deficiency in knowledge by directing a Radar Evaluation Working Group in the fall of 1952 to study the problem of radar performance at all altitudes and in various types of weather conditions to determine the capability of the currently deployed equipment. It was strongly suspected by ADC, however, that the report of the Evaluation Group, when published, would reveal serious shortcomings at very high altitudes. The significance of this deficiency lay in the fact that intelligence estimates of the capability of the Soviet Long Range Air Force indicated that by 1955 the USSR would possess a quantity of very high-flying bombers of the jet type which might take advantage of the high-altitude weakness of the ADC radar screen.[14] In this, as in so many other aspects of the surveillance story, a race against time was taking place. One gleam of hope in this direction was the

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14. Hq ADC, Air Defense Plan for the Continental United States, Vol. II: Requirements, 10 Nov 1952, HRF 114.

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development of the AN/FPS-8 radar, which besides giving a very good account of itself at altitudes lower than 30,000 feet, was estimated to be capable of extending the radar ceiling to approximately 60,000 feet.[15] The FPS-8 was scheduled as a prime search radar for the proposed Mobile Radar Program, but its operational contribution would not be felt until sometime in 1954.

The 34th Air Division area in New Mexico constituted an interesting problem in radar coverage -- and one that was not entirely unique to the air defense system as a whole. Included in the New Mexico area was an important concentration of AEC installations and air bases. The cover afforded to this complex by the five radar stations operating therein was widely separated from the coverage of adjoining areas to the west, north and east. Furthermore, there were certain intrinsic deficiencies in the existing cover. The three FPS-3 radars and the two Lashup radars deployed in New Mexico left much to be desired in the effectiveness of their coverage as compared to similarly equipped stations elsewhere -- primarily because of siting difficulties.

The Commanding General of the 34th Air Division was especially concerned by his dependence upon neighboring air defense systems for early warning of an enemy raid against the New Mexico complex. His reluctance to place full faith in the passage of timely information by neighboring radars prompted him to request of ADC Headquarters the establishment of two Lashup type radars in Colorado which were to pro-

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15. RADC, Technical Report, 52-22, 1 Nov 1952, pp. 39-49, HRF 207.

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vide additional early warning from the north contiguous to the New Mexico coverage. ADC expressed sympathy with the predicament of the 34th Air Division, but stated that there was a more urgent requirement for the placement of available radars within the critical areas defined by the double perimeters. Headquarters ADC, indicated, however, that the door was not entirely closed upon the 34th Air Division's requirement for additional radar coverage. Sometime previously, the Air Proving Ground Command had indicated its desire to establish a test air defense sector within the ADC system, in order to develop and test new equipment for air defense. ADC had, in answer, proposed the establishment of such a sector within the 34th Air Division area. The implementation of such a plan would have the effect of integrating into the 34th Air Division system an additional number of radars, thus increasing the coverage afforded. Until such time, however, a calculated risk had to be taken.[16] The Mobile Program, it was true, when fully implemented, would provide an additional three radar stations for New Mexico, but advanced early warning from the northern approaches to Los Alamos would remain for some time to come subject to the capability of the neighboring radar systems in California, along the Canadian border, and to the east, to detect intruders bound for Los Alamos.

The existence of the large radarless area south of the Montana-North Dakota frontier posed considerable problems to WADF. The failure to detect a raid heading southwest across the Montana border could well

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16. WADF to Capt H. Pike, "Preliminary Radar Siting," 16 Jul 1952 and 3 Inds, (Doc 5); ADC, C&E Diary, 9 Sep 1952, HRF 900.

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expose targets in the state of Washington to attack.[17] Similarly, a raid penetrating the single chain of radars across the northern frontier could conceivably be lost for some time in the coverless territory, while strikes were being directed against Los Alamos, San Francisco, Los Angeles, or other vulnerable targets on the edges of that area. The only resources against this danger was the alertness of the GOC in this area -- and the standby status of the latter organization in these regions precluded optimism on that score.

Operation SIGN POST, in July 1952, revealed characteristics of the radar network, some of which were well-known to ADC through previous experience, and some which were not. In general, during the exercise, ADC's radars, under the conditions of forewarning which existed, "demonstrated very high detection probability" -- at medium altitudes.[18] It must be mentioned, however, that the characteristics of the massed SAC strikes at medium altitudes favored long detection ranges. Nevertheless, the conclusions of the observers pointed to the face that the radars were performing their mission in detecting the entry of aircraft of heavy-bomber type at such altitudes. It was noted, however, that ranges against high-flying B-45 aircraft, were markedly lower than against B-36 aircraft -- a conclusion which was not surprising to ADC.[19]

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17. WADF, Air Defense Systems Plan, 11 Jul 1952, in ADC File.

18. ADC, Final Report, Operation SIGN POST, p. 7.

19. The 32d Air Division was of the opinion that the failure to detect B-45 type aircraft was not due to high altitudes solely, but to high speeds as well. Final Report, Operation SIGN POST, p. 80.

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As was also expected, detection ranges on the B-36 aircraft at altitudes above 30,000 feet were less than those obtained from the same aircraft at medium altitudes.

Another deficiency noted during Exercise SIGN POST was the intermittent failure of radars in continuous tracking operations. This was true not only for bomber-type aircraft, but was especially true for fighter aircraft. The 32d Air Division commented on this situation as follows:[20]

> Continuous tracking of fighter aircraft was poor except in instances where IFF was available. The continuous tracking deficiency in many instances reflected the inability of the radar to pick up targets in certain areas. In addition, the improper use of dead-reckoning techniques made it difficult to provide continuity until the targets appeared again on the radar. Radar stations were reluctant to coordinate their activities completely with each other.

A primary reason for the intermittent failure of the radars in tracking bomber-type aircraft, was the density of air traffic in certain areas. In the New York-Washington-Philadelphia area, for example, the unusual density of air traffic at peak periods cluttered the radar scopes to such an extent that it was exceedingly difficult to track an identified aircraft through the radar coverage in that area. Dead-reckoning procedures helped to some extent, but were not the sole answer to the problem. The use of trailer aircraft which would follow and report the position of the enemy was another alternative, but one which was not employed in the peacetime conditions prevailing in 1952. It was given serious consideration, however, for use in the event of

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20. As in fn 18.

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hostilities. Another answer to the problem of saturation of the radar scopes in areas of high air traffic density was the plan for the security control of air traffic. This plan, on the declaration of an emergency, was to provide for the immediate grounding of all unnecessary civilian air traffic, thus clearing the air so that the identification function could be performed more effectively. The use of trailer aircraft, and the enforcement of the security control plan, however, were measures which were contemplated in the event of hostilities, and as such, were not solutions to the immediate problem of continuous surveillance of unknown or hostile aircraft.

IV

So far this discussion of the capability of the electronic network has concerned the performance of the search radars. Height-finding radars also played a significant role in the surveillance scene. Although the height-finders were not important from the point of view of initial detection, they provided important surveillance information which was of use in both tracking of aircraft through dense traffic, and for GCI operations.

Three types of height-finders were in use in ADC during the latter half of 1952. These were: the AN/CPS-6B, of which 26 sets were in operation, including its variant, the AN/FPS-10; the AN/FPS-5; and the AN/CPS-4. The latter two height-finders, of which 24 were in operation in December 1952, were scheduled to be replaced as prime height-finders by the newer AN/FPS-4 and AN/FPS-6 radars. The AN/CPS-4

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was to be entirely withdrawn from air defense use at that time, but the AN/FPS-5 was to remain at designated sites as backup height-finding equipment.

Although all radar stations were programmed to have a height-finder as part of their primary equipment, only 50 of the 81 operational stations in December 1952 employed height-finders.[21] In general, the height-finders in the air defense system were deployed in four primary air defense areas. Thus, the Pacific Northwest area possessed seven height-finders, all located in the state of Washington; the California area possessed six height-finders in the Los Angeles-San Diego complex; New Mexico employed three, and the Northeastern region used 28. The only height-finders which did not subscribe to the principle of priority of the most vital areas, were those at P-47, P-77, P-52, P-78, and P-79, which were strung almost in a line from Kansas through Oklahoma and Texas. No height-finders were operating in December 1952 in the northern border along Montana, North Dakota and Minnesota, nor in the Oregon-Northern California area, nor at various points in the northeastern complex. The most obvious deficiency in height-finding capability, under the new double perimeter deployment concept, was along the western and southern walls of the northeastern area. Unfortunately, height-finding radar was not possessed in sufficient quantities to equip all the stations requiring them.

Both the presence and the absence of height-finding radar con-

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21. See map, "Height Finders in Operation, Dec 1952," which follows.

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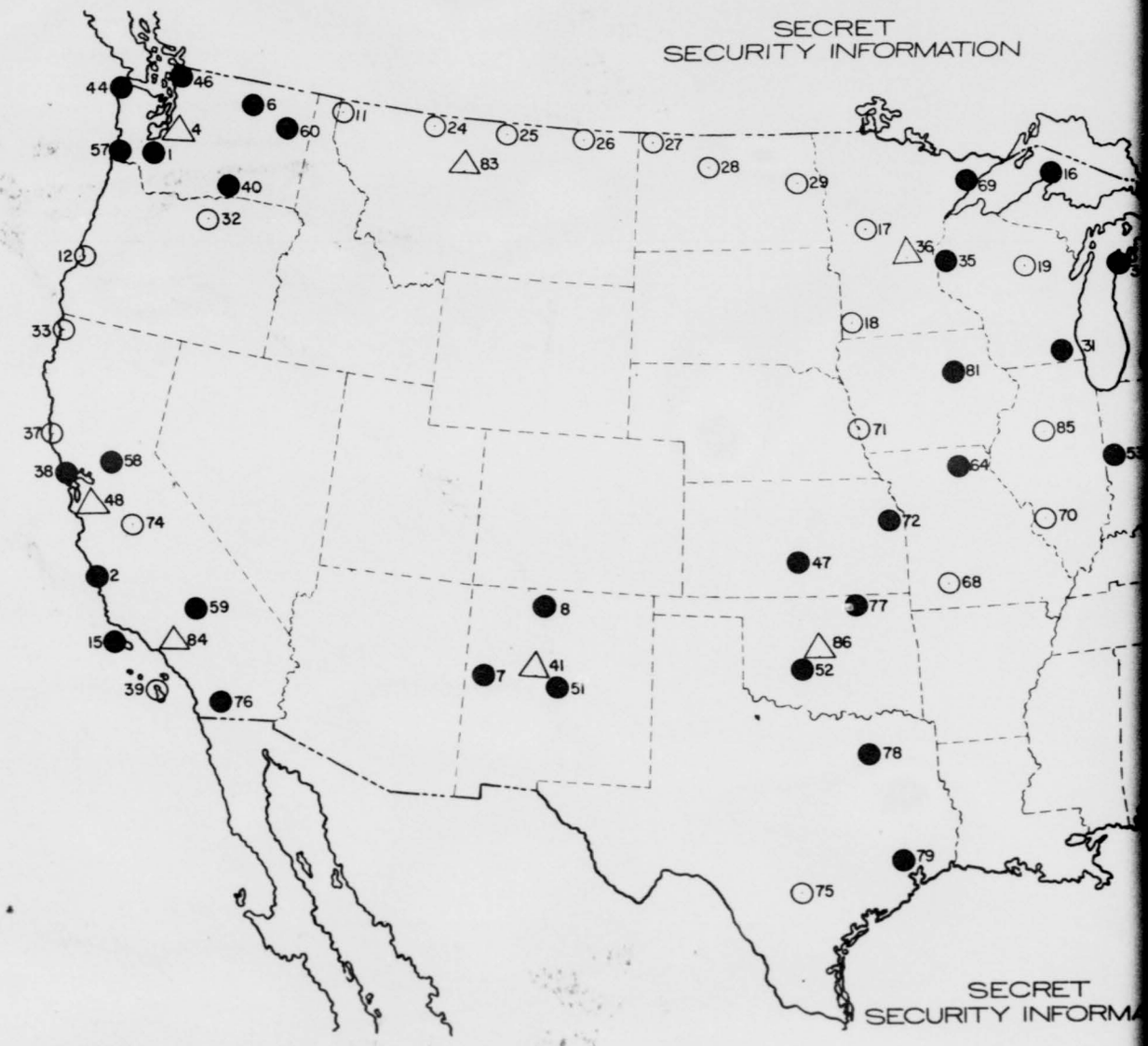

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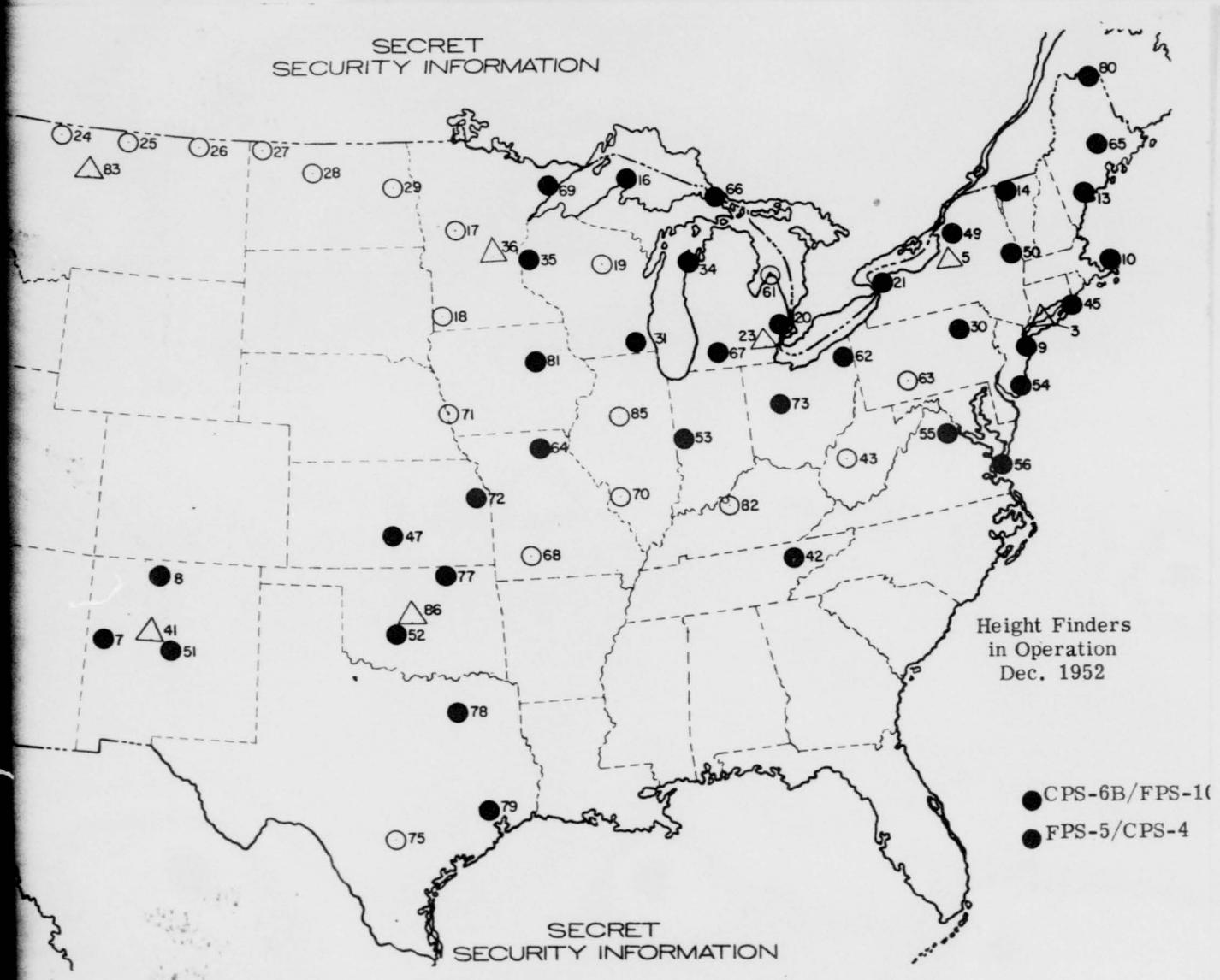

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stituted problems in surveillance. The average range of height-finding equipment employed in December 1952 was approximately 60 miles. When this figure is compared to the average search radar range of approximately 120 miles, it will be seen that height-finding ranges were only one-half of the search radar ranges. In effect, this meant that, though detection of an enemy aircraft could be accomplished at 120 miles, altitude information would not be available by height-finding radar until the intruder had travelled half the distance on a radial course over the station. Consequently there were many large gaps between deployed height-finding radars. The effect of this on ADC's surveillance capability was that a sharp change in altitude by an enemy aircraft flying through radar coverage could well result in a "faded," or lost, track. The influence of this state of affairs on GCI operations, was, of course, obvious. For accurate vectoring of fighter aircraft by ground directors, height information was indispensable, especially in night or foul-weather operations. At greater distances from the radar station than 60 miles, vectoring would be at the mercy of errors in dead-reckoning of height-information, and the consequences in missed interceptions incalculable.

The answer to the height-finder problem was clear -- to provide this type of radar for <u>all</u> stations, and to insure that this equipment matched the ranges of its companion search radars. Both aspects of this solution were undergoing implementation in December 1952. All stations in the AC&W systems were programmed to receive primary height-finders, and great hopes were placed in the capabilities of

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the two new radars, the AN/FPS-6 and AN/FPS-4, which were to be installed in the near future.

A factor which had an important bearing on surveillance capability was calibration of the radar equipment in use. Calibration had always been, and continued to be, one of ADC's thorniest problem. A shortage of authorized calibration aircraft, maintenance personnel and low priorities on B-29 replacement parts had resulted in the calibration units being far behind in their attempt to cope with the growing radar network. At long last, however, in December 1952, ADC was able to announce that all sites in the permanent network had received initial calibration, and that some sites had been calibrated more than once, but many such milestones had to be passed because the requirement for calibration was continuous.[22] In other words, now that all stations had received initial calibration, the whole process had to be performed over again.

Accurate calibration was significant to surveillance operations because of the fact that the exact location of the aircraft reported on the radar scope depended on the coincidence of its electronically reported position with geographical reality. If the scope reading was "off," a track passed to an adjacent station containing erroneous position information could result in confusion and delay. The effect on continuity of tracking of proper and timely calibration was extremely significant. Realizing this, ADC directed its Radar Evaluation Working Group to study the problem closely, and to recommend more economical

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22. ADC Command Data Book, December 1952, p. 7.5.

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and efficient means of calibration. The conclusions of the Group were still unreported at the end of the year.

V

So far in this present chapter, discussion has concerned the positive and negative attributes of the ADC surveillance network in terms of electronic "gaps." There was another problem, extremely serious, which was related to the problem of functional gaps and which may, perhaps, be described as a gap in "time." This problem concerned the provision of sufficient early warning of aircraft en route to the continental United States so as to enable timely concentration of weapons to be brought to bear against the enemy. The most important of such "gaps in time" were along the Pacific and Atlantic Coasts. In these coastal areas, the only resources available to detect enemy aircraft, whose targets were the many vital industrial and population centers close to the coasts, were ADC's shore-based radars.

At their very best, the shore-based radars could extend their electronic beams effectively to 200 miles to seaward. It was ADC's contention, however, that early warning to a minimum of 300 miles was necessary in order to prevent the enemy aircraft from reaching the bomb release line before sufficient combat time had elapsed to allow destruction.[23] The limited range of shore-based radars, consequently, placed in the most extreme jeopardy such cities as Seattle, San Francisco,

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23. Hq ADC, Air Defense Plan for the Continental United States, Vol. II: Requirements, 10 Nov 1952, Appendix 1, Annex C, p. 1, HRF 114.

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Los Angeles, New York, Philadelphia, and Washington.

The solutions to the problem of sufficient early warning to seaward were quite limited. Two alternatives presented themselves, both of which were adopted by the Air Force: the use of seagoing vessels and the use of long-range patrol aircraft, both carrying radar equipment, and patrolling the coastlines some distance off shore from the critical targets. The decision to employ both of these techniques in conjunction was made by the Air Force in 1950, and resulted in the programs known as the Picket Vessel and Airborne Early Warning and Control programs. By the end of December 1952, though appreciable strides had been taken to implement these programs, as yet no airborne early warning aircraft, nor radar-equipped picket vessels were available.[24] Operation SIGN POST, in July 1952, revealed the precariousness of the position of coastal targets by the impunity with which SAC bombers made their appearances over them.

A similar time gap, though by no means so serious as that along the coasts, existed in land areas adjoining the northern border of the United States. An extension of early warning along the avenues of approach to the continental United States from the north would afford much-needed time to the air defenses of the ZI. At an early date in the implementation of the air defense system, Headquarters USAF was able to prevail upon the Royal Canadian Air Force to sanction the establishment on Canadian territory of a network of ground radars

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24. See below chapter on Seaward Expansion of AC&W.

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jointly manned and equipped and designed not only to provide a defense of Canadian targets, but also to provide the continental United States with timely early warning of an impending attack. The Canadian radar program, known as the Radar Extension Plan (REP), called for the erection of 33 permanent-type ground radar stations in Canada. By December 1952, only two of these ground radars had achieved operational readiness. However, the Canadians had placed into operation as many of their World War II type radars as they could spare. By December 1952, seven Canadian Lashup stations were operating in the southeastern part of Canada, affording some measure of early warning to the important northeastern U. S. target complex.

The major plan in existence at the end of 1952 for improving the surveillance capability of the continental radar system remained the Mobile Radar Program. This program, which underwent a drastic revision in theory and development plans in January 1952, was designed to supplement the radar coverage in the Zone of the Interior by the addition of 79 more ground radars.[25] These stations were to employ equipment as modern and as capable as those which were installed in the earlier permanent 75-site radar program. Although in early planning, the Mobile radars were to be used to plug gaps in high and low altitude coverage where these gaps were most significant, this principle was drastically revised in January 1952 by ADC's successful advocacy of the double perimeter concept. According to

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25. See below, chapter on the Mobile Radar Program.

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ADC's point of view, the new stations, instead of being distributed throughout the United States according to the exigencies of the revealed radar coverage, should be deployed to strenghten the outer walls of the areas which were to be surrounded by the double perimeters. The program was developed in two phases. The first group of stations to be constructed, 44 in number, were to bolster radar defenses in the northeastern target complex, and to provide coverage for isolated targets in the interior of the U. S. The 35 stations of the second phase, were to complete the walls of the double perimeters in the three areas designated to be so surrounded. By December 1952, the Mobile stations were still a matter for the future, though tangible progress in planning and siting and equipment procurement had been achieved.

Still another program which was designed to increase detection capability in the Zone of the Interior was the Passive Detection program. This plan did not contemplate the use of ground radars, but rather a series of very sensitive receivers of electromagnetic impulses, strung around the western, northern and eastern perimeters of the United States. Although ADC, in late 1951, had received twelve passive detection assemblies, these were deemed inadequate in operational effectiveness to perform the primary mission of early warning which was assigned to them. It was obvious to ADC that considerable additional development would have to be undertaken for these equipments before firm plans could be made as to their deployment or the uses to which they would be put in the air defense system. By the end of 1952, consequently, the passive detection facilities owned

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by ADC were being used for testing purposes, rather than for active air defense operation.

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CHAPTER TWO

THE WEAPONS

I

At mid-1952, the Air Defense Command had an interceptor force of 40 squadrons. These 40 squadrons were deployed on 33 bases in position to protect major target areas and isolated targets.[1] The major portion of the interceptor forces were allocated to the defense of the northeast, northwest, and California areas. Within, or on the periphery of, these three regions were located 36 of the 40 squadrons, deployed on 30 bases. The four remaining squadrons were allocated to the defense of critical targets isolated from these areas.

To defend the northeast area, wherein was located the greatest number of critical targets, ADC had deployed a major portion of its interceptor force. On 24 bases were deployed 28 squadrons, which represented approximately 70 percent of the total fighter force.[2] This included 9 of the 15 all-weather squadrons available to ADC, 9 of the 13 day jet squadrons, and 10 of the 12 conventional squadrons.

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1. ADC, AC&W - Fighter Program, Jul 1952, HRF 900.

2. Aircraft strength by type was approximately equal in all squadrons, i.e., a squadron equipped with all-weather fighters, for example, stationed in the northeast had the same number of aircraft as an all-weather squadron in another area.

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All-weather interceptors were stationed along the northern and eastern border of the northeast's greatest concentration of critical targets: an area within a line running roughly from Chicago to Detroit to Boston, down to Washington D. C., and back to Cincinnati. On the north was deployed an F-89C squadron at Madison Municipal Airport, Wisconsin and an F-94B squadron at Selfridge AFB, Michigan. With the range of the F-89C at 30,000 feet at about 300 miles for an intercept mission and the F-94B at about 240 miles, these squadrons provided all-weather coverage from about the center of Minnesota as far east as the western border of New York state.[3] Along the eastern seacoast were stationed the remaining all-weather squadrons (equipped with F-94Bs): at Otis AFB, Massachusetts; McGuire AFB, New Jersey; New Castle AFB and Dover AFB, Delaware; and Andrews AFB, Maryland. Thus, the entire area outlined above was given all-weather coverage with the exception of a gap in northwestern New York state. This gap occurred because range of the nearest fighters at Otis AFB and McGuire AFB was insufficient to cover all of New York state. However, targets in southern New York were covered by squadrons from these bases. Deployment of the all-weather interceptors along the edges of this critical region made it possible to use the long ranges of these aircraft to intercept hostile bombers before they

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3. Interceptor range figures supplied by Mr. P. S. Ball, ADC Operations Analysis Office. Use of the term coverage does not imply impregnable defense, but simply that aircraft were so based and had sufficient range to be able to fly over the area.

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reached this area, as well as to cover it.[4]

The borders of this heavily industrialized and populated area were guarded also by day jet and conventional aircraft. Based at Madison Municipal Airport was an F-86F squadron; at Oscoda AFB, Michigan was an F-86A squadron (which was also in position to defend Sault St. Marie); at Griffiss AFB, New York was an F-86A squadron; and at Westover AFB, Massachusetts was an F-86E squadron. Interlaced between these squadrons to bolster the defense were conventional aircraft: F-51Ds at Selfridge AFB, Michigan; F-47Ds at Niagara Falls Airport; F-51Ds at Burlington Airport, Vermont; F-47Ds at Grenier AFB, New Hampshire, and F-47Ns at Suffolk AFB, New York.

Within this area, to provide a defense in depth, were four day jet squadrons. Stationed at O'Hare International Airport, Illinois were F-86As; at Wright-Patterson AFB, Ohio were F-86Es; at Lockbourne AFB, Ohio were F-84Cs; and at Greater Pittsburgh Airport were F-86As.

On the outer periphery of the entire northeastern area and within what was to become the 120 mile belt of the proposed double perimeter surrounding this area, was deployed a total of six squadrons. These squadrons were in a position to provide early defense of the northeast as well as to defend targets in their immediate vicinity,

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4. The concept of employing F-89s and F-94s as long range area interceptors was to be continued in the 57 squadron deployment. All aircraft of this type available were to be deployed along the international and coastal borders. Coastal deployment would also make possible the use of these aircraft with AEW&C aircraft. The F-86D, coming into the system in 1953, had much less range and was to be interlaced between the other types along the borders and to be used exclusively for interior defense. ADC, PROGRAM, Jan 1953, HRF 900.

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such as population and industry in Minnesota, Iowa, and Illinois, and the AEC installation at Oak Ridge, Tennessee. Deployment in this belt, moving in a clock-wise direction, was as follows: F-47Ds at Berry Field, Tennessee; F-51Hs at Scott AFB, Illinois; F-51Ds at Sioux City Airport, Iowa, Minneapolis-St. Paul Airport, Minnesota, and Duluth Airport, Minnesota; and F-80Cs at Dow AFB, Maine.

Fighter defense of the much smaller northwest and California areas consisted of a total of eight squadrons or 20 percent of the entire interceptor force. In the northwest, the most critical targets of which were in an area running from Vancouver to Seattle to Spokane to Pasco to Portland, were deployed four squadrons. This deployment included three all-weather squadrons and one day jet squadron, deployed on three bases. On the Pacific side of the Cascade Range, at McChord AFB, Washington, were two squadrons of F-94As and on the eastern side at Larson AFB, Washington, was a squadron of F-94Bs. Potentially, therefore, all-weather coverage was provided to all approaches to the critical area described above. To the south, providing the third leg of a triangular deployment, was a day jet squadron equipped with F-86Fs at Portland Airport, Oregon.

The California defended area, extending from San Francisco in the north to Los Angeles and San Diego in the south, also had four squadrons deployed on three bases. Protecting the San Francisco-Oakland Bay area were two all-weather squadrons (F-89Bs) at Hamilton AFB. In southern California, at Long Beach Airport, was a squadron of F-51Ds, and at George AFB (Victorville), was a squadron of F-86As.

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All-weather coverage, thus, was provided only for the north-central part of the California area, the section having the most frequent and longest periods of inclement weather.

In addition to the area defenses outlined above, the defense of a small number of critical targets isolated from these areas was provided. The Strategic Air Command base at Rapid City, South Dakota was protected by a squadron of F-51Ds stationed on that base. Targets in New Mexico — the SAC base at Walker AFB, the Special Weapons Command installation at Kirtland AFB, and the AEC installation at Los Alamos — were covered by a squadron of F-86As at Kirtland AFB. Lastly, the SAC base at Limestone, Maine was covered by two squadrons stationed at Presque Isle AFB, Maine: an all-weather squadron equipped with F-89Cs and a day jet squadron equipped with F-86As. The latter two squadrons, although outside the outer wall of the proposed northeast perimeter, were obviously also in position to provide early defense of the northeastern critical target area.

In general terms the above was the coverage given to critical targets by fighter aircraft of the Air Defense Command at mid-1952. In the following six months, changes which took place were relatively minor in regard to overall coverage of targets. By the end of December 1952, ADC had 43 squadrons deployed on 35 bases, with 40 of the total allocated to defense of the northeast, northwest, and California areas.[5] The actual number of squadrons equipped with aircraft, however,

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5. ADC, Program, 1 Jan 1953, HRF 900.

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had decreased to 39. The 59th at Otis AFB, Massachusetts (F-94Bs), moved to Labrador in October.[6] The squadron activated to replace this unit, the 437th, as well as the three squadrons added to the system in November as part of the programmed build-up, had not been equipped with aircraft by the end of the year.[7] All of ADC's squadrons were now regular Air Force units. The 20 Air National Guard squadrons in service at mid-year had been inactivated and replaced with regular units by the end of the year.[8]

Two of the three squadrons added to the system during this period were deployed in the northeastern United States. The 56th Squadron, to be ultimately equipped with F-86Ds, was placed at Selfridge AFB, Michigan and the 330th, also programmed for F-86Ds, was stationed at

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6. TWX, USAF to ADC, NEAC, 18 Jul 1952, AGC Files; ADC G.O. #8, 30 Jan 1953, (Doc 6).

7. ADC, Aircraft and Crew Status in Tactical Units and Armament Report, (RCS: 2-AF-D4), 29 Dec 1952, in AGC Files.

8. In all, a total of 24 squadrons were activated and assigned to ADC during this period, however, 20 of these were replacements for ANG units returning to state control. The aircraft and equipment of the ANG squadrons were reassigned to the new federal squadrons. Buildup of regular personnel in these units had started many months prior to the inactivation dates of 1 November and 1 December. All empty spaces which occurred from overseas transfer and release from active duty were filled with regular personnel and by over-manning as far as possible. In effect, therefore, these activations were no more than redesignations of units. Interview, Historian with Capt V. A. Winder, ANG Project Officer, ADC O&T, 16 Jan 1953. For a list of the ANG units which were returned to state control, see ADC, G.O. #45, 1 Oct 1952, and G.O. #49, 28 Oct 1952, (Doc 7). A comparison of crew manning and combat readiness of aircraft and crews in the ANG units in the month before they were inactivated and of the replacement units in the month after they were activated, shows such a slight change as to be negligible.

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Stewart AFB, New York. The latter base was one of the two additional bases occupied by an ADC fighter unit during this period. The squadron at this base was in a position to provide a defense in depth of the New York area. The 437th Squadron, which replaced the 59th at Otis AFB, was programmed to receive F-94Cs.

The defenses within the proposed northeast perimeter were further strengthened by the redeployment of the squadron of F-86A aircraft from Presque Isle AFB, Maine (the 75th) to Suffolk AFB, New York.[9] In addition, the gap existing at mid-year in northwestern New York state was filled by the allocation in July of F-89Cs to the 27th Squadron at Griffiss AFB, New York — until these aircraft were grounded, as will be explained below.[10] In all, 31 squadrons were deployed within, or on the periphery of, the northeast area by the end of December 1952. This was 72 percent of the total force which represented approximately the same relative distribution of strength as at mid-year.

The third squadron added to the ADC fighter force during this period was activated at Larson AFB, Washington.[11] This squadron, the

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9. The move of the 75th Squadron, scheduled for early conversion to F-86Ds, was desired to provide additional all-weather coverage for the New York metropolitan area. EADF to 4709th Defense Wg, "Movement of the 75th FIS," 14 May 1952, with 3 Inds, (Doc 8).

10. ADC, Diary #128, 10 Jul 1952 and #148, 8 Aug 1952, HRF 900.

11. This squadron was actually a replacement for the 82nd Squadron based at Larson AFB which was to be deployed overseas shortly after the first of the year.

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323rd, was scheduled to receive F-86D aircraft early in 1953.[12] All-weather coverage of the northwest area was augmented by the movement of the 83rd Squadron from Hamilton AFB, California, which was equipped with F-89Cs, to Paine Field, Washington (the second new base onto which a squadron was deployed during this period). The northwestern section, therefore, had six squadrons (five equipped with aircraft) by the end of 1952 or approximately 14 percent of the total force.

No additional squadrons were added to the defense of the California area. As noted above, one squadron was moved out of this area and into the northwest. Remaining was only one all-weather squadron in northern California and one day jet and one conventional squadron in southern California.[13]

Actual all-weather coverage was reduced, at least for normal operations, by the grounding of all F-89 aircraft on 22 September 1952 because of engine and structural defects.[14] Five squadrons were

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12. ADC, Program, 1 Jan 1953, HRF 900.

13. A more equitable distribution of strength between these two areas was planned for the 57 squadron deployment. By mid-1954, six squadrons were to be deployed in the California section at Hamilton, Travis, Castle, Oxnard, Palmdale, and George, and seven squadrons in the northwest: one at Portland, Paine, and Geiger, and two at McChord and Larson. ADC, Program, 1 Jan 1953.

14. TWX, ADC to USAF, 23 Sep 1952, (Doc 9); TWX, ADC to USAF, 31 Sep 1952, AGC Files. All aircraft equipped with the J-35A-21 series engines (F-89Bs and some F-89Cs) were grounded because of a growing number of cases of failure of these engines. The remaining F-89Cs, which had the J-35A-33 engine, were grounded because of structural defects in the wings. This action was accomplished by ADC pending satisfactory repair or replacement. On 4 October 1952, Air Materiel Command grounded all F-89 aircraft indefinitely, and plans were made to send

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equipped with the F-89: the 74th at Presque Isle AFB, Maine; the 27th at Griffiss AFB, New York; the 176th at Madison Airport, Wisconsin; the 83rd at Paine AFB, Washington; and the 84th at Hamilton AFB, California. To restore as much of the lost all-weather capability as possible, USAF directed transfer of 35 F-94Bs from the Air Training Command.[15] Later, USAF agreed to the request of ADC for the reassignment of ATRC's remaining F-94Bs, which amounted to approximately 19 additional aircraft or a total of 54.[16]

Initially, ADC had planned to provide all five F-89 squadrons with ATRC F-94Bs. However, the small number of F-94Bs to become available made this impractical.[17] It was decided, therefore, to place the ATRC F-94Bs in only the most exposed areas. Thus, these aircraft were allocated to the 84th Squadron at Hamilton AFB, the 74th Squadron at Presque Isle AFB, and the 433rd Squadron at Madison Airport (formerly the 176th ANG Squadron). In the last week of November, the first five F-94Bs were received. These were assigned to the 74th Squadron.

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14. (Continued) the F-89s to the Ogden AMA for engine retrofit and to the Northrup plant (the manufacturer) at Ontario, California for structural modifications. ADC, Diary #188, 6 Oct 1952, HRF 900; ADC to AMC, "Modification of F-89 Type Aircraft," 12 Oct 1952, (Doc 10); ADC, Command Data Book, Jan 1953, p. 3.0, HRF 900.

15. TWX, ADC to USAF, 31 Sep 1952; TWX, ADC to ADFs, 25 Oct 1952, AGC Files.

16. ADC, Diary #226, 1 Dec 1952, HRF 900.

17. Interview, Historian with Lt Col F. A. Campbell, Jr., ADC, P&R, 3 Jun 1953.

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By the end of the year, approximately 30 of the 54 aircraft had been received and divided among the three squadrons.[18]

To the 83rd Squadron at Paine AFB, Washington, on the Pacific side of the Cascade Range, where two F-94 squadrons were already located, were assigned 25 F-84G day jet fighters diverted to ADC from the Mutual Defense Assistance Program.[19] The 27th Squadron at Griffiss AFB was re-equipped with F-86A day jets by means of a redistribution of aircraft within EADF.[20]

Had an emergency arisen during this period, the ADC forces would have been augmented by fighters from other Air Force commands, from the Air National Guard, and possibly from the Navy. Allocations of aircraft from other Air Force commands were made on a monthly basis. In July, a total of 537 fighter aircraft would have been available for emergency air defense from the resources of the Strategic Air Command, the Tactical Air Command, and the Air Training Command.[21]

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18. ADC, Command Data Book, Jan 1953, p. 3.4, HRF 900.

19. As in fn 18, Dec 1952, p. 3.0. In all, 140 F-84Gs were to be assigned to ADC from the MDAP. In addition, 75 F-86Fs were to be transferred to ADC early in 1953. Primarily, these aircraft were to be used to convert conventional aircraft equipped squadrons. By the end of fiscal year 1953, there would be only four conventional squadrons left.

20. TWX, ADC to EADF, 28 Oct 1952, AGC Files.

21. ADC, Operations Order 10-52, 1 Jun 1952, App 1, Ann A, and Amendments, in AGC Files. For agreements between ADC and other major USAF commands on allocation of aircraft for emergency air defense, see ADCHR #2, pp. 61-66.

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Included were 280 day jets, 193 conventional fighters, and only 32 all-weather jet aircraft (F-94s). In each of 16 inactive Air National Guard squadrons, with a mobilization assignment to ADC, there were 25 F-51s or a total of 400 aircraft.[22] Finally, the Navy reported in July a total of approximately 687 regular and reserve aircraft available on an indefinite basis.[23] Participation of Naval fighters in emergency air defense was contingent upon the needs of the Navy in fulfilling its primary mission.[24] For this reason, ADC felt that it could not depend upon Navy fighters in an emergency.

The majority of the fighters allocated by major USAF commands were not suitably located either for defense of critical target areas

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22. R&R, ADC, O&T-F to Mgt. Anal., "Monthly Combat Readiness Commentary," 17 Jul 1952, (Doc 11).

23. As in fn 22. Navy fighters were predominately of the conventional type: F4Us, F6Fs, and F6lDs. A smaller number were day jets, F9Fs, F2Hs, FH-1s, FJ-2s, and a few were jet all-weather fighters, F3Ds.

24. Although considerable progress had been made in agreements with the Navy, the latter's participation in emergency air defense remained uncertain, (for details of these agreements see ADCHR #1, pp. 239-244; and ADCHR #2, pp. 58-61). The Chief of Naval Operations reiterated his stand in October 1952 with the statement that Naval participation in Air Defense would be to the extent permitted by the primary mission of the units concerned. In commenting to USAF, ADC pointed out how little this meant for air defense. "While this statement conforms with current Department of Defense policy," ADC stated, "it guarantees nothing in air defense augmentation. Therefore, it is not practical to consider the Navy's capability (except incidentally), in the development of current and future air defense plans." ADC recommended a JCS decision on the matter. 1st Ind, ADC to USAF, 30 Nov 1952 to USAF to ADC, "Chief of Naval Operations Function Letter (OPNAV Instruction 003320.2)," 29 Oct 1952, (Doc12).

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or for operation with the ground control net. Therefore, it was necessary for ADC to plan for deployment of these forces to more suitable locations when an emergency arose. At mid-year, the emergency deployment of 25 detachments of other USAF command fighters (averaging about 16 each) was planned to 17 bases (see map on following page).[25]

To bolster the defense of the northwest area, Larson AFB was to receive TAC F-51s from Clovis AFB, New Mexico and ATRC F-80s from Nellis AFB, Nevada; Geiger AFB was to be occupied by TAC F-51s from George AFB; McChord AFB was to receive TAC F-51s from George AFB and ATRC F-80s from Nellis AFB; and Paine AFB was to receive ATRC F-80s from Nellis AFB.[26] The defense of the northern California area was to be augmented by TAC F-51s from George AFB and ATRC F-86s from Nellis AFB moving to Hamilton AFB, and by ATRC F-84s from Luke AFB, Arizona moving to Castle AFB and Travis AFB. Adding to the southern California defenses were to be TAC F-51s stationed at George AFB and ATRC F-80s and F-86s moving to George AFB from Nellis AFB.

The northeastern critical target area defense was to be augmented as follows: Oscoda AFB was to receive TAC F-47s from Godman AFB, Kentucky and ATRC F-94s from Tyndall AFB, Florida; O'Hare International Airport was to receive TAC F-51s from Clovis AFB and ATRC F-94s from Tyndall AFB; Duluth Airport was to receive TAC F-51s from Clovis AFB; and Griffiss AFB was to receive TAC F-47s from Godman AFB.

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25. As in fn 21.

26. As in fn 21.

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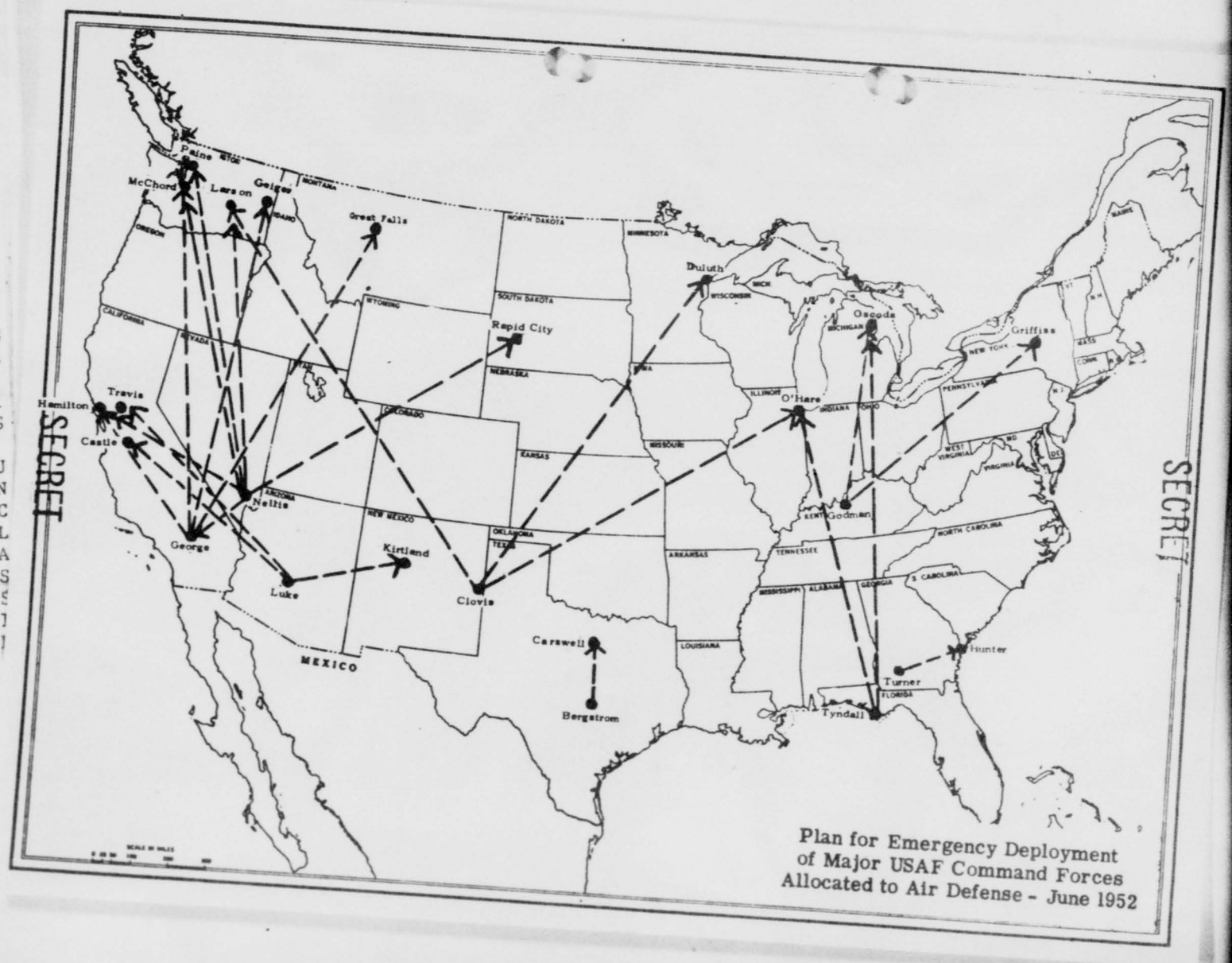

Plan for Emergency Deployment
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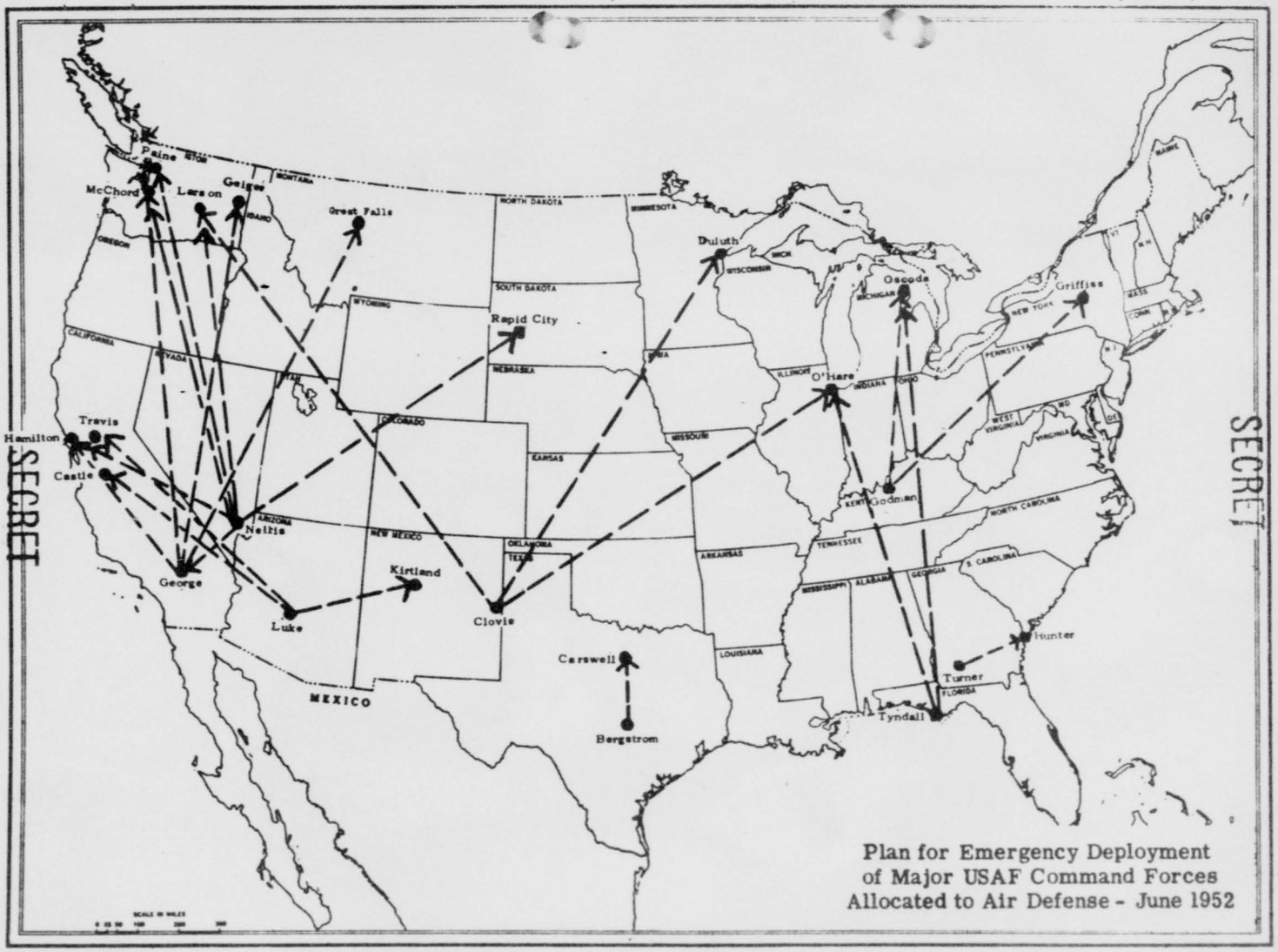

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The ADC defense of isolated targets was to be augmented also. To the SAC base at Rapid City, South Dakota, was to be deployed a detachment of ATRC F-86s from Nellis AFB. For the defense of targets in New Mexico, ATRC F-51s and F-80s were to move from Luke AFB to Kirtland AFB and a detachment of TAC F-51s at Clovis AFB, New Mexico was to be employed from that base. In addition, deployment was planned for the protection of targets not covered by ADC forces: SAC F-84Gs were to move from Bergstrom AFB, Texas to the SAC bomber base at Carswell, Texas, and from Turner AFB, Georgia to Hunter AFB, Georgia (near the ARC installation at Savannah). Some protection was also to be provided the midwest's northern border by movement of TAC F-51s from George AFB to Great Falls AFB, Montana.

In the event insufficient warning of a hostile attack was received to allow deployment of other USAF command forces, a plan existed for use of fighters which were located within radar coverage at their home bases. A total of 343 aircraft were available for utilization on this basis at seven locations.[27] These included F-84Gs at Turner AFB, Georgia, F-84Gs at Bergstrom AFB, Texas, F-47s at Godman AFB, Kentucky, F-94s at Tyndall AFB, Florida, F-51s at Dow AFB, Maine, F-51s at George AFB, California, and F-51s at Kirtland AFB, New Mexico (the latter would come from Clovis AFB).

Naval aircraft were generally more suitably located for defense of the critical target areas. The majority of the Navy's forces were

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27. As in fn 21, App 2, Ann A.

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deployed along the eastern and Pacific seacoasts and within the major target areas as is shown on the map following page 40.

Of the 16 ANG squadrons, 13 were located within the northeastern critical target area. Two were in California. The remaining ANG squadron was at Dallas, Texas.

In the following six months of this period, the pattern of deployment planned for other USAF command forces into the northwest, California, and northeast critical target areas remained approximately the same. Some changes occurred in the number or type of aircraft moving from one base to another mainly as a result of overseas movement or conversion of units belonging to other USAF commands. In regard to defense of isolated targets, Carswell AFB, Texas and Hunter AFB, Georgia were dropped, but the SAC bases at Offutt AFB, Nebraska, Forbes AFB, Kansas, and Walker AFB, New Mexico and the Air Material Area Depot at Tinker AFB, Oklahoma, were added.[28] In all, the deployment of 22 detachments to 19 bases was planned.[29]

The overall strength of forces available for emergency air defense was somewhat reduced at year's end. TAC, SAC, and ATRC allocated a total of 383 fighters.[30] These included 206 day jets,

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28. ADC, Operations Plan 4-53, 1 Jan 1953, Ann A, HRF 900.

29. The in-place utilization (in event of insufficient warning) of aircraft at five bases was also planned.

30. RAR, OMT-F to Mgt. Anal., "Monthly Combat Readiness Commentary," 16 Dec 1952, (Doc13).

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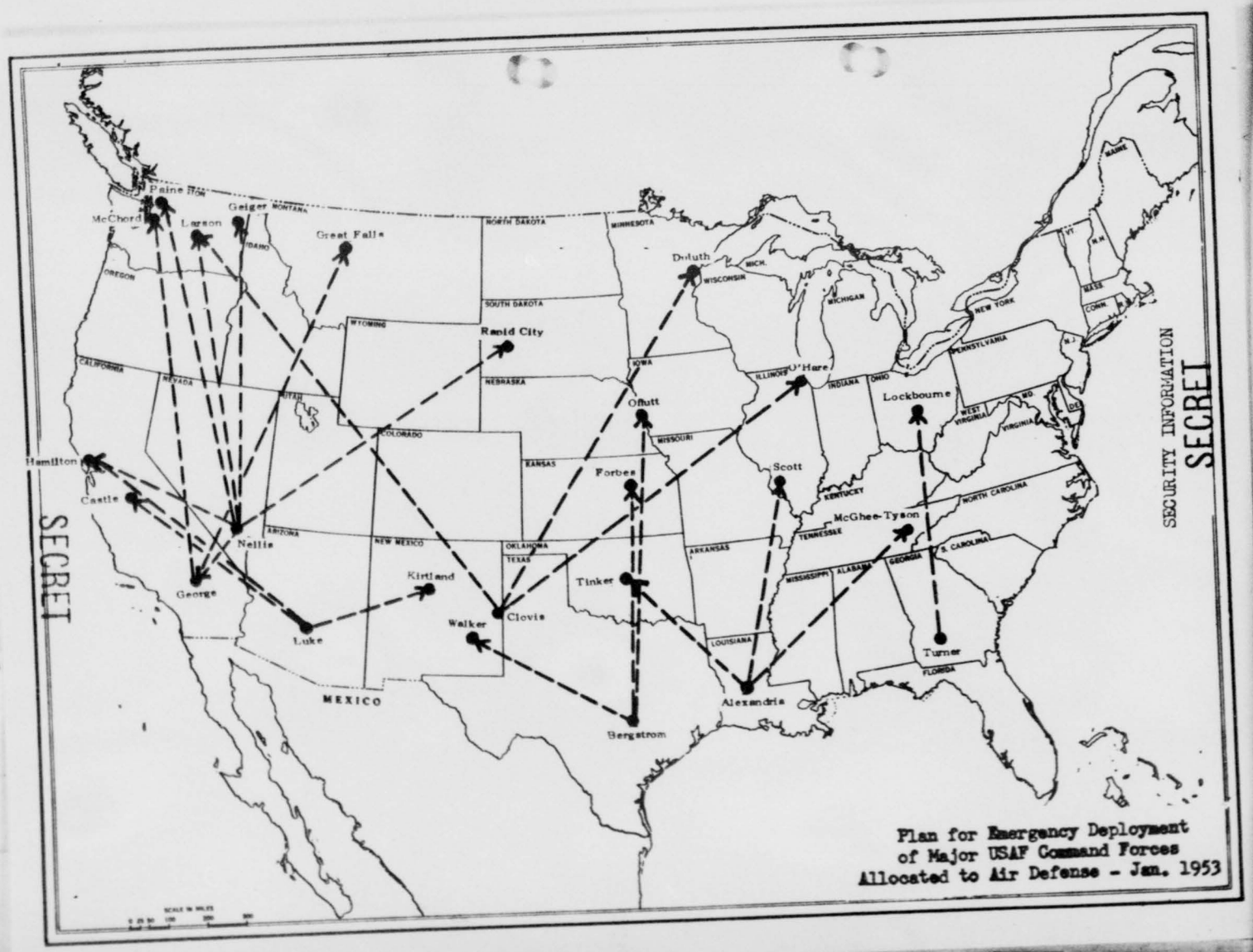

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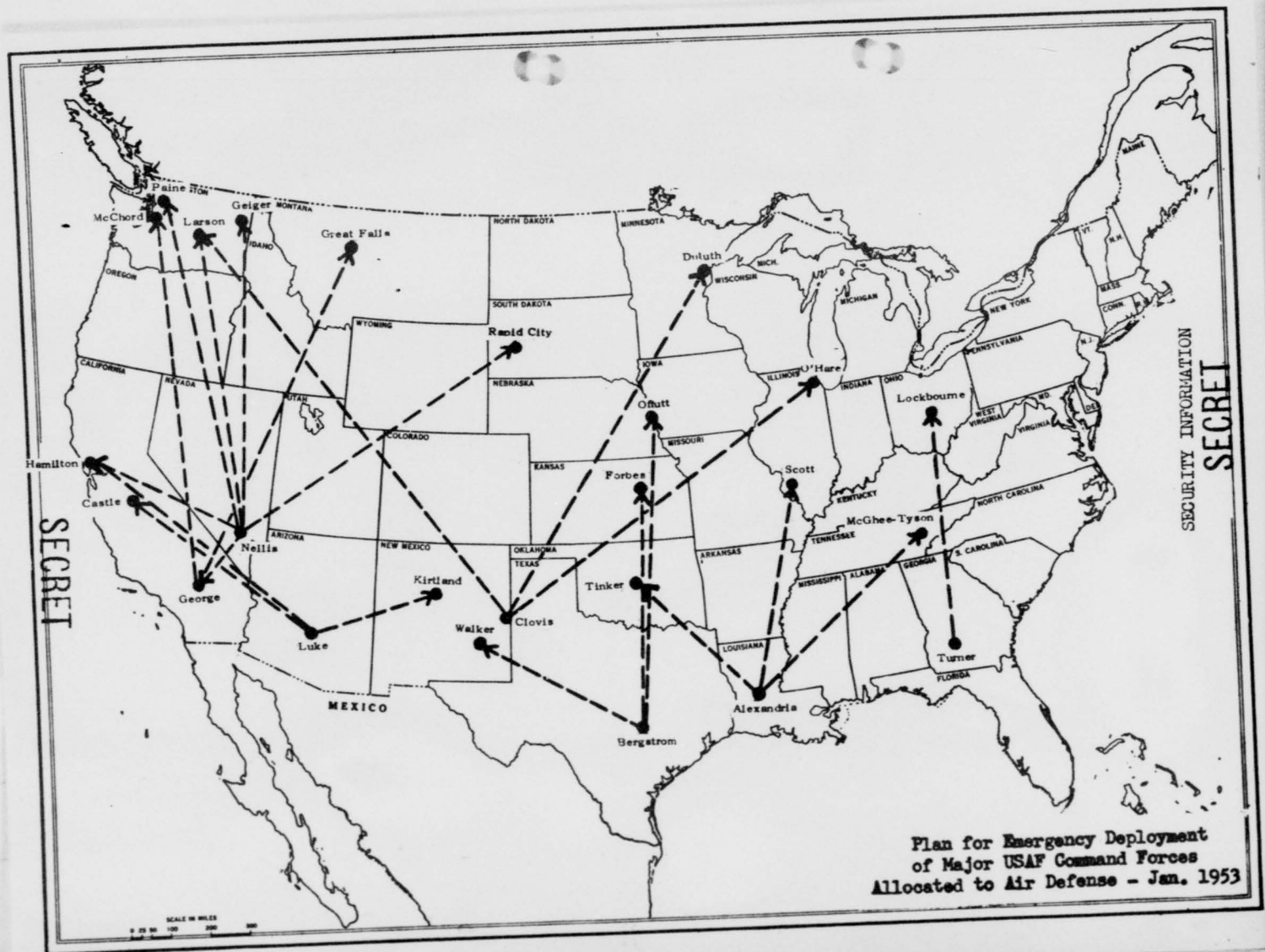

Plan for Emergency Deployment of Major USAF Command Forces Allocated to Air Defense - Jan. 1953

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170 conventional fighters, and only 7 all-weather jet aircraft. The ANG squadrons with a mobilization assignment to ADC now numbered 52, but capability in all of them was extremely limited.[31] Most of these squadrons had just returned from active duty without aircraft. Fighters belonging to the 16 ANG squadrons which had not been federalized were being distributed among all the squadrons.[32] Thus, the potential in any one of these squadrons was low at the end of the year. Lastly, there were approximately 910 regular and reserve Navy fighters reported in the Zone of the Interior at the end of 1952.[33] As before, however, the availability of any or all of these aircraft was limited by the primary Naval mission.

In addition to the fighter defenses outlined above, at mid-1952, 20 critical target areas across the nation were being defended by the

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31. ADC, Statement of Effectiveness, Jan 1953, p. 25, AGC Files. Following the inactivation of all ANG squadrons, a total of 17 ANG Fighter Wings (52 squadrons) were formed and assigned an initial mission of fighter-intercept (considered the primary mission) with mobilization to ADC. After the initial phase of the war, which was estimated to be a period of three months, 11 of these wings were to change to a fighter-bomber mission with assignment to Tactical Air Command. The six remaining wings, totalling 18 squadrons, were to remain assigned to ADC. USAF to ADC, "Mission of ANG Fighter Units," 6 Oct 1952, (Doc 14); R&R, ADC, DCS/O to C/S, "Progress Report on Use of Inactive ANG Units for Air Defense," 15 Nov 1952, (Doc 15).

32. In addition, each ANG squadron was to be allocated tactical aircraft from regular ANG channels. By the end of Fiscal Year 1955, the entire Guard was to be jet-equipped according to current planning. Interview, Historian with Capt V. A. Winder, ADC, ANG Project Officer, OAT, 16 Jan 1953.

33. As in fn 30.

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FIGHTER FORCES AVAILABLE FOR AIR DEFENSE I
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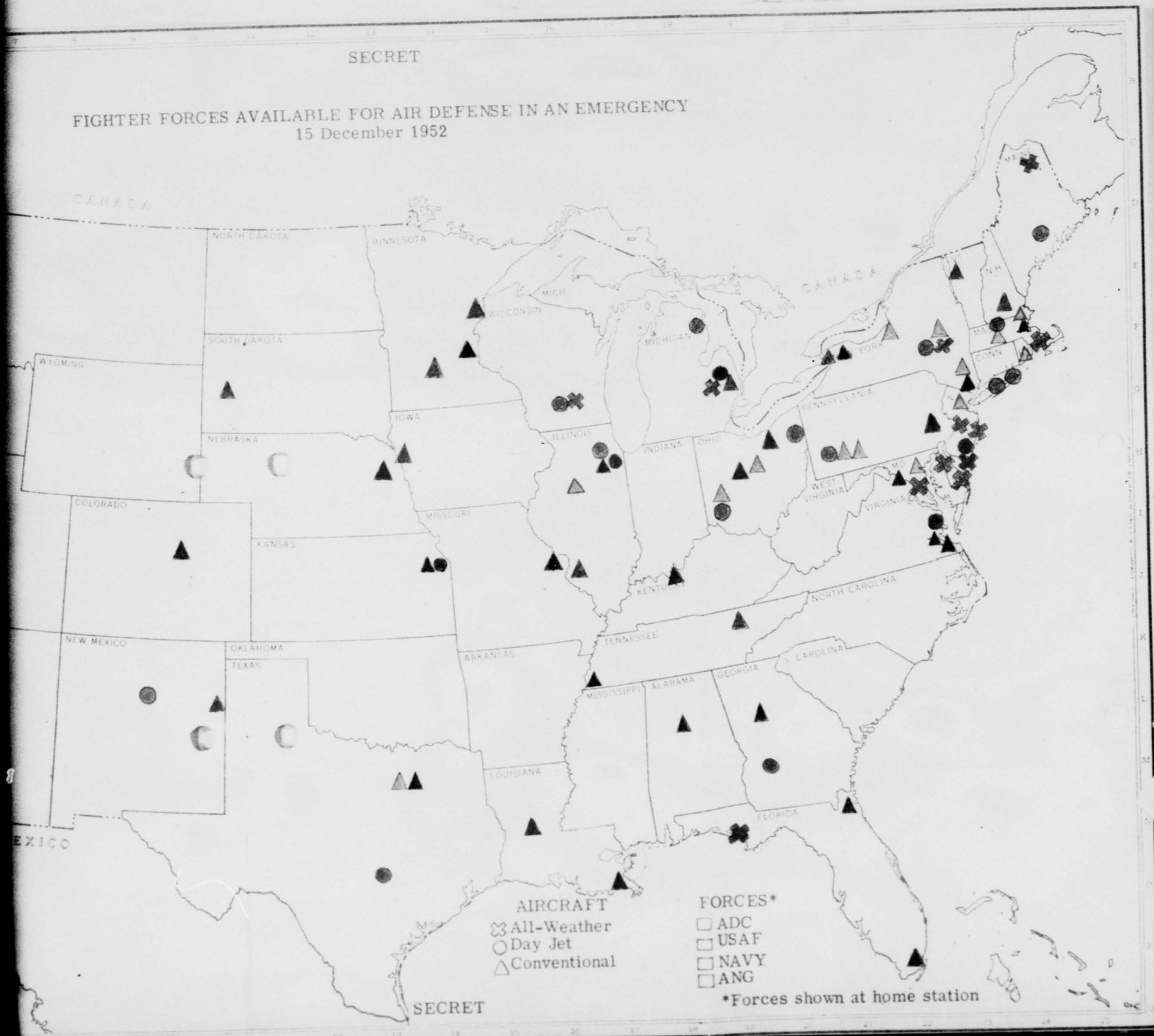
FIGHTER FORCES AVAILABLE FOR AIR DEFENSE IN AN EMERGENCY
15 December 1952



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guns of the Army Antiaircraft Command.[34] The total number of batteries assigned to defense of these areas at this time was 232. Of these, only 98 were located at tactical sites. The remaining 134 batteries were at interim stations; 75 of these were within 75 miles of the area to be defended and 59 were located over 75 miles from their tactical sites. In addition, 4 batteries at Ft. Hood, Texas were designated for emergency deployment to Carswell AFB, Texas and 4 batteries at Ft. Bliss, Texas were designated for emergency deployment to Kirtland AFB.[35]

Throughout this period the concerted effort, started in April 1952, to place all batteries on tactical sites, continued. A complete account of the on-site program, as well as the development in all other phases, is given in the Army Antiaircraft Command report for 1952, appended as a document to this history. By the end of 1952, of the 220 batteries (55 battalions) assigned at this time, 200 were stationed on site.[36] The other 20 batteries were at interim stations. Of the latter, 16 were assigned to defense of SAC bases (four at each of four bases). In addition, two of the 40 batteries assigned to the defense of New York and two of the eight batteries assigned to the

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34. ADC, Operations Order 10-52, 1 Jun 1952, App 1, Ann C, in AGC Files. For terms of the working agreement between ADC and the ARAACOM, see the ARAACOM-ADC "Mutual Agreement for the Air Defense of the United States," 15 Jul 1952, (Doc16).

35. As in fn 34.

36. ARAACOM, Command Report, 1952, p. 17, (Doc 17).

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defense of Niagara were at interim stations.

In the northeast, batteries were on site at the end of 1952 at New York, Boston, Niagara, Washington, Philadelphia, Pittsburgh, Baltimore, Chicago, Detroit, and Sault St. Marie.[37] In the northwest, batteries were on site at Seattle and Hanford, and in California at San Francisco. The batteries assigned to the defense of the SAC bases at March AFB, Castle AFB, and Travis AFB in California and Fairchild AFB, Washington were deployed on interim stations nearby because of lack of facilities at the SAC bases.[38]

The battalions assigned to the defense of the Sault St. Marie area and the four SAC bases were equipped with automatic weapons (40mm or quadruple .50 caliber guns).[39] Of the remaining battalions, 14 were equipped with 120mm guns and 36 were equipped with 90mm guns.

II

What portion of the defensive potential outlined above could have been brought to bear on enemy bombers? Of the total fighter forces, only a minor percentage could have been made available to fight immediately had an attack been made with no forewarning in July 1952. These fighters would have come from the ADC and TAC aircraft on advanced states of alert. At this time, ADC was maintaining, insofar as possible, the following alert schedule: during the period

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37. As in fn 36.

38. As in fn 36, p. 9.

39. As in fn 36, p. 17.

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from two hours before sunrise until two hours after sunrise, four aircraft were to be on five-minute alert and four aircraft on one-hour alert at each base; during the period from two hours after sunrise until one-hour after sunset, two aircraft were to be on five-minute alert at each base, two day fighters were to be on 15-minute alert at each base where available, and six all-weather fighters and four day fighters were to be on one-hour alert at each base where so deployed; and during the period from one-hour after sunset until two-hours before sunrise, two all-weather fighters were to be on five-minute and two all-weather aircraft were to be on one-half hour alert at each base where available, and two day fighters were to be on 15-minute and six day fighters were to be on one-hour alert at each base where available.[40]

The alert commitment was to be met by each base rather than by each squadron which meant that at two-squadron bases, only one squadron stood the alert at one time, or the requirement was divided between them. Of the 33 bases occupied by ADC fighters at mid-1952, 8 had all-weather aircraft only, 22 had day fighters only, and 3 had both.

Tactical Air Command aircraft were standing a "two-ship" five-minute alert at three bases: Dow AFB, Godman AFB, and George AFB,

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40. As in fn 34, Ops. Order 10-52, p. 4. A deviation in the alert requirement existed in the case of Newcastle AFB, Dover AFB, and Andrews AFB, all on the east coast. These bases were grouped close together and had one all-weather squadron each. Only two of these three bases were required to meet the alert schedule. This meant that all-weather aircraft were on alert at only 10 of the 11 bases on which these aircraft were deployed at mid-year.

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two hours before sunrise until one hour after sunset.[41] However, only two aircraft were added to the system, for Godman AFB was the only base not also occupied by an ADC squadron. At the other two bases the requirement was shared.

The greatest number of aircraft available for immediate employment at any time, therefore, was during the critical dawn period. For a short time in the early morning when the dawn alert was being met at all bases, there was a total of 130 aircraft on five-minute readiness.[42] There was a gradual decrease, because of the difference in time zones, to 66 aircraft on five-minute and 50 aircraft on 15-minute alert during the day period. Aircraft available for immediate employment further decreased until for a few hours at night there were only 20 all-weather aircraft on five-minute alert and another 20 on one-half hour alert. An additional 50 day fighters could have been made available at night, for what capability they could have offered, in approximately 15 minutes. The total number of aircraft on advanced states of alert gradually increased as bases, starting in the east and moving across the nation, went on the dawn alert.

One to two hours advance warning of an attack would have enabled ADC to increase its fighter force available for immediate employment considerably. ADC aircraft which could have been put on a five-minute

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41. As in fn 34, p. 3.

42. All figures are based on the assumption that the minimum requirement was being met at all bases where required.

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readiness status or higher within an hour would have totalled approximately 256 during the dawn period, 262 during the day period, and 240 at night (200 of which were day fighters).[43]

A revealing test of the increase in strength which would have resulted from one to two hours advance warning came in the incident of 17 April 1952 when approximately the same alert requirements as at mid-year were in force. In the early morning on this date, as a result of contrail sightings at Kunivak, Alaska and a report of unknowns in the northeastern United States at approximately the same time, an Air Defense Readiness was called.[44] At the time the readiness was called at 0311 hours (Colorado Springs time), there were 88 aircraft on five minute alert across the nation.[45] One hour later the number on this status had been increased to 240. At the end of the second hour, there were 249 aircraft ready to scramble and another 74 which could have been made ready within an hour.

Movement of augmentation units as planned in an emergency would

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43. There was a slight day to day variation in the total number of aircraft on alert because alert requirements were to be met, "at each base insofar as the number of assigned and combat-ready aircraft will permit." ADC Operations Order 10-52, 1 Jun 1952, p. 4. As an illustration, on 30 Jun 1952 there were an average of 252 aircraft on alert, while on 10 Jul 1952 there were an average of 255 aircraft on alert. ADC, Diary #125 and #131, 3 Jul and 15 Jul 1952, HRF 900.

44. For a more complete account of this incident and its results, see ADCHR #3, Jun 1952, pp. 136-140.

45. Gen B. Chidlaw, ADC CG to Gen H. Vandenberg, USAF C/S, 5 May 1952, with incls, "Next to the Real Thing," HRF 108.

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have required more than one to two hours, but in this time the possibility existed that at least a part of the augmentation fighters stationed at bases located within radar coverage could have been made ready to scramble. At this time, it will be recalled, aircraft allotted for air defense from SAC at Turner AFB and Bergstrom AFB, from TAC at Godman AFB, Clovis AFB, George AFB, and Dow AFB, and from ATRC at Tyndall AFB, were to be made available upon notification of an emergency, if there was insufficient time for their deployment. This in-place utilization plan was, however, entirely untested and therefore, the readiness with which these forces could have been made available for combat was undetermined. The ANG and the Navy could have made available only a very small number of aircraft within two hours, according to current estimates.[46]

How much time then would have been required for all of the fighter forces to have become ready for combat? It was estimated that within three hours, all of the ADC combat-ready aircraft could have been made ready to scramble.[47] At mid-year, there were 436 aircraft combat-ready of the 734 assigned.[48] By types of aircraft this included: 108 combat-ready all-weather fighters of 190 assigned, 164 combat-ready day jet fighters of 266 assigned, and 164 combat-ready

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46. F. M. Varney, Chief, ADC OOA to W. J. Horvath, Mass Inst Tech, 14 Aug 1952, (Doc 18).

47. Interview, Historian with R. H. Blythe, Jr., ADC OOA, 7 Jul 1953.

48. As in fn 18, p. 3.5.

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day jet fighters of 266 assigned, and 164 combat-ready conventional fighters of 278 assigned. Of those not combat-ready, at least another five percent could have been placed in a combat-ready status within a few hours. As time progressed, more and more of those not able to fight initially could have been made ready. There would, of course, have been a certain percentage which could not have been made available for days, if at all.

The best indication of the time required for augmentation fighters to become ready for scramble at the bases to which they were to be deployed, came in the nation-wide air defense exercise, "Operation SIGN POST," held from 24 to 28 July 1952. ADC forces were augmented for this exercise by a total of 324 aircraft, 147 from TAC and 177 from ATRC. It took twelve hours for the entire force to be in place after ADC requested deployment.[49] Only two units reached their deployment base in less than 10 hours, with all others requiring from 10 to 12 hours. In addition to this time, an average of two hours was required after arrival at deployment bases before any aircraft were ready to scramble. Many units required as much as six hours to become ready to scramble. Thus, augmentation aircraft required 12 to 18 hours to become ready to scramble in an exercise for which there had been some advance warning. Both the ATRC and the TAC units had been alerted for deployment prior to the exercise, but without being given exact

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49. ADC, Operation SIGN POST, 24-28 Jul 1952, Final Report, 12 Sep 1952, pp. 82-83, (Doc 4).

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times. It was felt by the ADC augmentation project officer, Major B. E. McKenzie, that deployment for actual hostilities would have taken more time than that taken during the exercise.[50]

It was estimated that the 16 ANG squadrons could have all of their combat-ready aircraft ready to scramble in from four to eight hours.[51] In each squadron, 12 aircraft was considered to be the maximum combat-ready at any one time or a total of 192 in the 16 squadrons. Naval fighters would have been ready in force in about 12 hours, assuming that they would have been made available.[52]

From the foregoing, it is apparent that if an enemy attack had been made with little or no forewarning, for the first few hours (possibly as many as 12), ADC could have counted on little more than its own combat-ready aircraft: 108 all-weather fighters, 164 day jets, and 164 conventional aircraft. Augmentation aircraft would have been unable to assist in countering an initial no-warning attack. If during this initial period, enemy action caused severe loss of ADC aircraft, augmentation fighters would have served as replacement.[53]

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50. R&R, ADC, O&T-F to Mgt Anal, "Augmentation Forces During Sign Post," 4 Aug 1952, (Doc 19.

51. As in fn 30.

52. As in fn 46.

53. At this time, there existed no pools of aircraft or aircrews for replacement of attrition. A requirement for such was recognized and various possibilities were being studied. R&R, O&T-F to DCS/O, DM, P&R, 23 May 1952, in ADC O&T Files.

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This was not the intention of the augmentation plan. Because of the possibility of an initial saturation raid destroying the war-making capability of this nation, ADC desired that as many fighter aircraft as possible be brought to bear on enemy bombers in the initial attack.

To speed the deployment and readiness of augmentation fighters of other USAF commands, an intensive effort was made during the latter half of 1952 to rectify deficiencies in the plan uncovered in "SIGN POST." More detailed indoctrination and detailed coordination between augmentation units and the receiving organizations was begun.[54] Major commands were encouraged to take full advantage of the training program for their forces at the base to which they were to be deployed. A plan to insure adequate logistical support was worked out. Each major command was to have a five-day level of supplies and equipment (except ammunition and fuel) prepared at the home station of each unit, to accompany the unit to its deployment base.[55] At all ADC bases to which augmentation deployment was to be made, ADC was to furnish the fuel and ammunition. At other bases, ADC was to furnish the ammunition if it was not available, otherwise the command concerned would furnish it and the fuel.[56]

In December, ADC approached USAF with the possibility of obtain-

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54. As in fn 50.

55. ADC, Operations Plan 4-53, 1 Jan 1953, HRF 900.

56. Interview, Historian with Maj B. E. McKenzie, ADC O&T-F, 4 May 1953.

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ing an alert commitment from all augmentation commands.[57] Nothing had come of this, however, by the end of the year.

ADC had more success in setting up an alert plan for the ANG. At the end of the year, ADC had obtained approval from USAF and the National Guard Bureau for starting a two-base alert test.[58] Five pilots were to be placed on active duty early in 1953 at two ANG bases to maintain a two-plane alert from an hour before sunrise to an hour after sunset using ANG fighters. Tentatively, the 138th Squadron at Syracuse, New York and the 194th Squadron at Hayward, California were chosen as test squadrons. If the test proved successful, USAF stated, ADC would be allotted 75 manpower spaces in Fiscal Year 1954 and 150 manpower spaces in Fiscal Year 1955 for ANG air defense alert commitments.

Meanwhile, as had been the practice in the past, ADC lowered its own alert requirements at the end of the critical summer months, when the possibility of attack was less likely. Lower alert requirements were felt necessary when feasible because of the need to provide as much aircrew training as possible.[59] Beginning 1 October 1952, two aircraft were required to be on five-minute and two aircraft on one-hour alert at each base during the day period (one hour before

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57. ADC, DCS/O, Projects Reports, 15 Dec 1952, HRF 900.

58. As in fn 57, Jan 1953.

59. R&R, DCS/O to DCS/I, "Intelligence Information Needed to Plan Aircraft Utilization," 22 Aug 1952, (Doc 20).

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sunrise until one hour after sunset); at night (one hour after sunset until one hour before sunrise), four all-weather fighters were to be on alert, two on five-minute and two on one-hour, at each base where available, and two day fighters were to be on one-half hour alert at each base where available.[60] On 1 October, ADC had a total of 143 aircraft on all states of alert during the day and 134 at night.[61] The combat-ready aircraft totalled 428 on this date: 108 all-weather fighters, 156 day jets, and 164 conventional aircraft.[62] There were no TAC fighters on alert. TAC stopped standing alert beginning 1 September 1952 because of a pilot shortage.[63]

As has been shown, the Army Antiaircraft Command had 98 batteries deployed on tactical sites at mid-year. This number had been increased over two-fold by the end of the year to 200 batteries on site. The normal state of readiness for batteries on site was 20 minutes. This

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60. R&R, O&T-F to Mgt Anal, "Monthly Combat Readiness Commentary," 19 Sep 1952, (Doc 21).

61. ADC, Diary #187, 3 Oct 1952, HRF 900.

62. As in fn 48; Included were 41 F-89s reported as combat-ready, although grounded for normal operations. ADC had specified that the grounded F-89s were to be kept in a combat-ready condition. Indicative of the shortage of aircraft and ADC's desire to increase its combat force was the order in late October 1952 to the Defense Forces to install guns and gunsights in the T-33 jet trainer aircraft. These aircraft were to be flown, thereafter, with a full combat load of ammunition and hot guns. No T-33s were to be used to meet alert requirements, but were to be used for emergency defense. At the end of 1952, 54 T-33s were on hand in ADC (34 in EADF and 10 each in CADF and WADF). ADC, Diary #205, 29 Oct 1952, HRF 900.

63. ADC, Diary #154, 18 Aug 1952, HRF 900.

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meant that within 20 minutes after receipt of an order to advance to a maximum state of combat potential, day or night, batteries on site could be ready to engage a target.[64] Batteries located at interim stations would have required at least six hours to reach their tactical sites.

III

During the latter half of 1952, it will be recalled, ADC's interceptor force consisted of F-89 and F-94 all-weather fighters; F-86, F-84, and F-80 day jets; and F-47 and F-51 conventional aircraft. Aircraft types allocated from other major USAF commands included all of the above except the F-89. Navy aircraft included conventional fighters of the F-47 and F-51 class (F6F, F8F, F4U, and FG-1D); day jet fighters of the F-80 and F-84 class (FH-1, F2H, and F9F); a day jet roughly comparable to the F-86, the FJ-2; and a twin-place jet all-weather fighter, the F3D.

According to rated performance characteristics, combat speeds of ADC's day jet fighters ranged from 427 knots for the F-80C to 524 knots for the F-86F.[65] The F-94s had a combat speed of 426 knots and the F-89s of 460 knots. All were capable of operating at altitudes

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64. Interview, Historian with Maj H. A. Lowe, G3 Sec AAA, 31 Jul 1953.

65. ARDC, Standard Aircraft Characteristics, Vol 1, "Green Book," 11 Jul 1952. Combat speed, selected for an intercept mission, is the highest speed obtainable in level flight at combat weight, maximum power, and combat altitude. Faster speeds are obtained with jets at low altitude. The opposite is true of conventional aircraft.

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above 40,000 feet, under normal conditions. The propeller-driven F-47 had a maximum speed of about 350 knots at 25,000 feet and the F-51 a maximum speed of about 380 knots at 25,000 feet.[66] Approximately 35,000 feet was the maximum altitude for the conventional aircraft.

All ADC aircraft, with the exception of the F-89, were armed with .50 caliber machine guns. The F-94 had four .50 caliber guns, all the others had six. The F-89s had six 20mm cannons. Grounding of the latter aircraft in September, therefore, left the .50 caliber as the largest gun.

The bomber with which these fighters and their armament would have had to deal was the Soviet TU-4. The TU-4 was estimated to have approximately the same performance as the USAF B-29.[67] If so, the TU-4 had a maximum speed of about 360 knots, a combat ceiling of about 39,000 feet, and a service ceiling of about 42,000 feet.[68] The standard armament of the TU-4 was estimated to be either eleven 12.7mm or eleven 23mm guns.[69] Estimates of TU-4 armament for an

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66. As in fn 3. The maximum speeds given here could have been achieved for only a very short period and at the optimum altitude.

67. As in fn 55, Ann C.

68. As in fn 65, performance figures are from the characteristics of the USAF B-29B.

69. ATIC, "Estimated Characteristics of Soviet Air Weapons," 1 Jan 1952, p. 3, ADC Intelligence Files.

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attack against the United States ranged all the way from the standard equipment to one turret in the tail, with all others removed and fuel added to gain additional range.[70] It was assumed that the TU-4 had adequate radar, including tail-warning equipment.

A comparison of the performance characteristics indicates that all of the jet aircraft available for air defense had considerable advantage over the TU-4. Conventional fighters, on the other hand, had no more than marginal performance advantage against a bomber of this type.

Interceptor armament no more than equalled that of the TU-4. With either the .50 caliber or the 20mm gun, the interceptor had to close to at least 1000 feet before firing, which put the fighter in an extremely vulnerable position.[71] This disadvantage would have been greatly apparent in the case of all-weather fighters making an attack under night or adverse weather conditions. If the conventional dead astern, low-overtaking speed, approach was used, which was still specified by USAF tactical doctrine,[72] and the bomber had defensive tail turret fire of the nature described above, the probability of kill would have been extremely low.

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70. Interview, Historian with Mr. R. H. Blythe, ADC OOA, 16 Jul 1953.

71. ADC, Briefing, Apr 1953, p. 39.

72. ADC to USAF, "Interceptor Tactics Employing the E-1 Fire Control System," 12 Jan 1952, HRF 324.

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For this reason, ADC was pushing the development of rocket armament and collision course or curve of pursuit firing. According to a report of experience gained in the air war in Korea and of tests conducted by the Air Force and the Navy in the United States, rockets were probably the most valuable against bomber aircraft, but were especially important for all-weather fighters operating under adverse weather conditions.[73] The shotgun blast effect obtained with rockets would do much to insure the destruction of bomber aircraft without the necessity of repeated attacks, this report concluded.

Future interceptors were to be equipped with rockets (see section IV, this chapter). To improve current capability, ADC sought to introduce the rocket as soon as possible. The most suitable rocket to become available shortly was the 2.75". In December 1952, ADC began receiving the first of some 83 sets of rocket pods for installation on F-94Bs.[74] Although the gunsight on the F-94B was not designed for rocket firing, it was felt that enough accuracy could be obtained to increase kill capability of this aircraft. Lt. Col. W. I. Olson, Acting Chief of the ADC Fighter Division, expressed the feeling of ADC this way: "Even though this rig would be sadly lacking in kill probability, it does give us a little better chance of knocking an enemy down. ... we believe that we need to take every chance we can

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73. 1st Ind, WADF to ADC, 8 Apr 1952, to Larson AFB thru WADF to ADC, "Evaluation of USAF Fighter Development Program," 14 Mar 1952, HRF 305.

74. TWX, ADC to EADF, 8 Dec 1952, HRF 306.

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get."[75] No operational 2.75" rockets had become available by the end of 1952, however.

Collision course firing used with rockets, which was executed at a large angle off the bomber, plus the increased effective range of rockets (about 1000 yards with the 2.75"), made the interceptor much less vulnerable and increased kill probability. Coordinated attacks by more than one all-weather interceptor through the use of radar snake formations would further enhance the probability of destruction. These tactics as well as all others were being explored by the Air Proving Ground Command (APGC) for all-weather interceptors during the latter half of 1952. APGC's study, along with all-weather research conducted by the Defense Forces, was to be used as the basis for the preparation of an all-weather tactics manual, the first ever prepared by ADC.

The performance which could have been expected of some of the interceptor types against a TU-4 bomber, as well as the most effective fighter tactics, was shown in test missions conducted with bombers having characteristics equal or superior to the TU-4. In three test missions considered between F-86 fighters and B-36 bombers, the F-86 demonstrated excellent maneuverability and was able to make almost any type of attack successfully and with continuity up to 35,000 feet.[76] Above 35,000 feet, effective attacks could still be

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75. R&R, ORT-F to ORT-A, 17 Nov 1952, (Doc 22).

76. EADF to ADC, "Fighter Tactics, F-86 Versus B-36," 14 Aug 1951, (Doc 23). WADF to Distribution, "Report of Test Mission Involving Interceptors and the B-36," 1 Feb 1950, HRF 324. Hist of WADF, 1 Jul to 31 Dec 1951, pp. 270-271.

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made, but the fighter was limited in the types of attacks used because of loss of maneuverability and rate of closure. Adding to the difficulty at high altitude was the relatively short interceptor gun range. In one of the tests, conducted in WADF, against B-36s flying at 46,000 feet, all pilots had difficulty in closing the firing range to less than 1500 feet.[77]

It was concluded in two of the tests that above 40,000 feet, except for an initial head-on pass, every attack would end up in a rear quarter chase. In all tests, the astern attack was the least satisfactory because of the heavy fire-power in this area. The slow rate of closure on this type of attack, especially at high altitudes, gave the bomber crew ample time to track the fighter, placing it in an extremely vulnerable position. In one test, on all rear cone attacks, the bomber's radar detected the F-86s well beyond the interceptor's gun range.[78] It was believed, however, that rear-quarter flank attacks, which would eliminate fire from all but the flank guns, or coordinated attacks by more than one fighter, which would dissipate the fire, could be made successfully.

When the bombers were flying at altitudes which permitted the fighters to get on top of them, overhead attacks were very successful with all factors in favor of the fighter. The high rate of closure and breakaway made it extremely difficult for the bomber gunners to

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77. As in fn 76, Hist of WADF.

78. As in fn 76, WADF to Distribution.

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track and fire on the fighter. Attacks from below were successful in the firing pass, but the fighter became vulnerable in breakaway because of loss of speed. Head-on attacks were made successfully, in these tests, at all altitudes. The high rate of closure made detection by the bomber difficult if contrails were not present. Above 40,000 feet, however, in a head-on attack the fighter took too much time to come into position for another pass.

The limited effectiveness of conventional aircraft was shown in a performance test conducted with two F-51Hs and two F-47Ns and a B-50 bomber flying between 30,000 and 33,500 feet. On this mission, the F-51s were able to make successful attacks up to 33,500 feet, but the F-47s were not able to make attacks over 31,000 feet.[79] Both aircraft were only slightly faster than the bomber, with the F-51s having the greatest speed differential. The participants in this test concluded that these fighters could effectively attack the B-50 type bomber, within altitude limitations, and provided that the armament range of the bomber was less than that of the fighter, which was not saying much for conventional aircraft.

In attacking the B-50 bomber, a variety of passes was used, with the overhead and high side being the best. Flat side and low side passes were less successful. Frontal attacks were the least effective. The latter attack took excessive time for the fighters

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79. ADC, OAT-F, "The Performance of F-51H and F-47N Aircraft at Altitude and Their Effectiveness Against the B-50 Bomber," 19 Mar 1951, (Doc 2b).

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to begin the pass and then to regain position for another assault.

The inadequacies of conventional aircraft were well demonstrated in the air defense exercise mentioned previously (Exercise SIGNPOST). During this exercise, conventional aircraft of both the Air Force and the Navy were unsuccessful against any bombers flying over 35,000 feet. In a critique following the exercise in the 28th Air Division on the West Coast, one of the Division spokesmen illustrated this deficiency when he pointed out that on one occasion two F-51s vectored to a flight of bombers "... got to 35,000 and saw the bomber aircraft sailing gaily over their heads at 40,000."[80] Also in this critique, a Navy spokesman from the Alameda, California, Naval Air Station reported the same problem, "Now what happened on a couple of intercepts was that the Corsairs [F4U] located the bomber at 45,000 and were blowing a cylinder trying to get up to 35,000."[81] Any contribution of the ANG was also limited. As an example, a report from the 26th Air Division on the East Coast commented: "... due to the type of aircraft in these units [ANG] intercepts against high flying target aircraft proved futile."[82]

To man its interceptors, ADC had 862 combat crews on hand

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80. 28th AD Hist, 1 Jul-31 Dec 1952, Doc #3, "Minutes of Critique of Air Defense Exercise Sign Post," 1 Aug 1952, p. 12.

81. As in fn 80, p. 38.

82. 26th AD Hist, 1 Jul-31 Dec 1952, Doc #6, 26th AD to EADF, "Operations Sign Post," 15 Aug 1952.

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at mid-year.[83] Combat crew availability had increased only slightly, to 906, by the end of 1952. At the end of the year, the crews on hand included 313 all-weather crews (pilots and radar observers) for the 153 all-weather interceptors available, 316 day jet pilots for the 271 day jet fighters on hand, and 277 conventional pilots for the 215 piston-engine aircraft available.

Of the crews on hand in July 1952, 498 or 57 percent were combat-ready.[84] In December 1952, 516 crews were combat-ready or approximately the same percentage of those on hand at mid-year. During this period, as in the past, a much greater percentage of the day jet and conventional pilots were combat-ready than the all-weather crews. At the end of the year, there were 137 all-weather crews combat-ready, 206 day jet pilots combat-ready, and 173 conventional pilots combat-ready.

Lack of gunnery proficiency was the greatest factor in preventing pilots from being considered combat-ready. Only 20 percent of all ADC pilots were qualified as experts in gunnery and 38 percent were completely unqualified.[85] All-weather pilots, as a group, were the least capable of hitting a target. Only nine percent of these pilots were qualified as experts and 53 percent were unqualified.

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83. As in fn 48, p. 3.7.

84. As in fn 48, p. 3.7.

85. As in fn 48, p. 4.15.

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The all-weather pilots qualified were in units having F-94s assigned originally. No pilots were qualified in F-89 aircraft and none of the pilots in F-89 squadrons which had been re-equipped with F-94s were qualified by the end of the year.

Among the causes for the lack of gunnery proficiency in all-weather squadrons, other than those affecting all squadrons such as inadequate gunnery ranges, were: the difficulties in qualifying with the E-1 fire control system (installed in the F-94 and F-89) which the pilots had never completely mastered and which was out of commission much of the time; the shortage and low in-commission rate of all-weather fighters in general; and the many groundings of the F-89.[86]

The long and frequent groundings of F-89s had prevented little more than transitional training for the squadrons possessing them and after the final grounding, there was a deterioration of any proficiency gained in F-89s.[87] The example of the 176th Squadron (redesignated the 433d) at Truax AFB illustrates this situation. The 176th Squadron received F-89C aircraft in March 1952. Between that date and the final grounding of these aircraft in September, the 176th's F-89s were grounded four times for a total of 90 days.[88]

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86. R&R, DCS/O to IG, "Summary of Inspections of 2d, 121st, and 142d FIS," 12 Aug 1952, (Doc 25); For a detailed study of these problems see ADCHR #3, Chap Six, pp. 230-236 and pp. 251-260.

87. TWX, EADF to ADC, 2 Oct 1952, (Doc 26).

88. IG, USAF to ADC, "Readiness Inspection of the 176th FIS, Truax Field, Madison, Wisconsin," 30 Sep 1952, ADC-IG Files.

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Only 520 hours were flown on these aircraft during this period. On surveying the 176th early in September, a USAF Inspector General team reported that, "The 176th Fighter-Interceptor Squadron is not capable of performing its assigned mission. Frequent groundings of F-89 aircraft by higher authority has prevented aircrews from progressing beyond the transition phase."[89]

The Army Antiaircraft weapons, as has been shown, included the .50 caliber machine gun, the 40mm gun, the 90mm gun, and the 120mm gun. The smallest antiaircraft weapon, the .50 caliber, had an effective range of about 1000 yards. Next in line was the 40mm which had an effective range of about 2000 yards. These weapons, deployed mainly in defense of SAC bases, were to be replaced in the near future with the 75mm gun (see Section IV, this chapter). The 90mm gun had a maximum range of about 37,000 feet.[90] The largest weapon was the 120mm gun with a maximum range of about 48,000 feet.

The actual effective range of the 90mm and the 120mm depended upon a great number of factors, of course, such as the capability of the fire control system and the type of fuze used. In the air defense exercise conducted during this period (SIGN POST), one of the reasons given for limited effectiveness of antiaircraft weapons on a number of raids was extreme bomber altitude.[91] This was the case

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89. As in fn 88.

90. Dept of the Army, FM 44-2, Aug 1950, par 11, and FM 44-4, Nov 1950, par 147.

91. As in fn 36, p. 21.

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in strikes against Seattle, San Francisco, Chicago, and Detroit.[92] The bombers attacking these cities were flying at altitudes between 40,000 and 42,000 feet.

Fading of tracks before they entered antiaircraft range was another major cause of ineffectiveness during Exercise SHOW POST.[93] The completion of the program to equip all batteries with an improved surveillance radar, the AN/TPS-1D, by the end of 1952, and the integration of these radars into the AC&W net in the near future, was expected to greatly increase the probability of target acquisition.[94]

Aside from weapons deficiencies, effectiveness of antiaircraft units was greatly limited in Exercise SHOW POST by the restrictive rules of engagement extant during this period. Under the engagement rules, the normal status of antiaircraft weapons was "Guns Tight," i.e., batteries could fire only at hostile aircraft.[95] An aircraft was defined as being hostile before declaration of a state of military emergency, if it committed a hostile act (bombing or firing of weapons except on a recognized range, or mine-laying), or if it was declared hostile by the air defense force commander or higher authority. After

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92. As in fn 36.

93. As in fn 36, p. 20.

94. ADC, Statement of Effectiveness, Jan 1953, AGC Files.

95. ADCR 55-1, "Rules of Engagement for Antiaircraft Weapons," 7 May 1952, HRF 606.

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declaration of a military emergency, an aircraft was defined as being hostile if it was not identified and was declared hostile by an air division commander. Therefore, failure to designate a hostile track as such could result in failure of the antiaircraft unit to engage the track. As long as there were weaknesses in the ACSN system, there was the possibility of hostile tracks entering an antiaircraft defended area without being declared hostile.

Exercise SIGN POST brought this problem into sharp focus. During this exercise, 25 strikes penetrated antiaircraft defended areas, but only five were successfully engaged.[96] The most important reason for unsuccessful engagement of the other 20 strikes, according to the Army Antiaircraft Command,[97] was late identification or no identification. The problem was, of course, considerably enlarged by the presence of heavy civilian air traffic.

The basic problem would not diminish, however, under conditions of an actual attack. When conditions of air defense warning "Red" and Security Control of Air Traffic were in effect, all unknown aircraft penetrating an air defense identification zone (ADIZ) would be declared hostile. If the hostile track was carried through the ADIZ and into the antiaircraft defended area, it would be immediately fired on by all weapons available. It was possible, however, that the hostile aircraft could penetrate without detection or after pene-

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96. As in fn 36, p. 19.

97. As in fn 36, p. 20.

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trating the ADIZ would be lost inside (such as might happen in the case of a mass raid fanning out in different directions). If either of the latter happened, aircraft appearing over an antiaircraft defended area could not be fired upon until they had been declared hostile or they had committed a hostile act.

Furthermore, many critical targets and antiaircraft defended areas were not within an ADIZ but were adjacent to one, as in the case of Boston, or were some distance inside a perimeter formed by ADIZs, as in the case of Chicago. The possibility was even greater in the case of such targets as these that hostile aircraft, penetrating coastal or international borders undetected or having been lost after penetration, could appear over an antiaircraft defended area and not be engaged immediately.[98]

One solution to this problem was proposed in ADC Regulation 55-1, issued on 7 May 1952, which established the rules of engagement for antiaircraft weapons. This regulation announced the intention of ADC to establish "Gun Defended Areas." These were defined as definite surface areas around critical targets defended by antiaircraft weapons over which the air space would be denied to all aircraft except those specifically cleared by air division commanders. In these areas the normal status of antiaircraft weapons was to be "Guns Free," i.e., any aircraft not identified as friendly would be fired upon. However, by the end of 1952, no areas of this nature had been established.

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98. R&R, G3, ARAACOM to P&R, ADC, "Concept of Gun Defended Area," 11 Aug 1952, (Doc 27).

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USAF would not approve the concept.[99] Higher headquarters seemed to feel that with the establishment of air defense perimeters around critical targets areas, the problem would be solved.[100] Another problem was that of deciding which targets would be designated as "Gun Defended Areas." This turned out to be one of major proportions.

At any rate, in August and September 1952, the concept was again presented to USAF with a number of clarifications. The original term, "Gun Defended Area," was now thought to be inappropriate since ground-to-air missiles would soon be defending some areas. The establishment of perimeters, which would become ADIZs, around critical target areas would place all antiaircraft defended areas within an ADIZ. Therefore, a more descriptive term was thought to be "Inner ADIZ", although even this was noted to be not entirely adequate.[101]

In this "Inner ADIZ," or whatever it was to be called, the normal status of antiaircraft weapons was to be "Guns Tight," it was stated, until an air defense warning "Red" was announced or until a hostile act was committed.[102] Upon announcement of an air defense

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99. Interview, Historian with Maj B. E. McKenzie, ADC O&T, 4 Aug 1953.

100. Maj Gen F. H. Smith, ADC VC to Maj Gen H. B. Thatcher, Dir Plans USAF, 18 Sep 1952, (Doc 28); R&R, P&R to O&T, "Inner ADIZs," 19 Aug 1952, (Doc 29).

101. As in fn 100, Smith to Thatcher.

102. As in fn 100, Smith to Thatcher.

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warning "Red" or commission of a hostile act, the status was to become "Guns Free." As established originally, the normal status of antiaircraft weapons in the restricted area was "Guns Free." Whether this was to be the status before, as well as after, declaration of an air defense warning "Red" was not specified. Although the problem never presented itself, because "Gun Defended Areas" were never established, under the original concept there was the possibility of friendly unknowns being shot down prior to warning "Red" conditions.

By the end of 1952, no further progress had been made in the establishment of these areas. The whole plan was still under study and the ADC Regulation of 7 May 1952 was still in effect.

In the meantime, ADC had directed each Defense Force to employ all means possible to improve the techniques for the correlation of tracks carried in the ACSW system, or computed by dead reckoning, with tracks acquired by antiaircraft radar, and to insure effective team work between antiaircraft commanders and the ADDC directors.[103] By so doing it was hoped to avoid some of the dangers inherent in the current system and the current procedures.

IV

The foregoing has described the defensive forces existing during the latter half of 1952 to combat the threat of this period, i.e., a threat of the TU-4 nature. Of great importance also were the programs

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103. ADC to WADF, "Coordination with Antiaircraft Command," 13 Oct 1952, (Doc 30).

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for improving and increasing the combat forces of air defense to meet threats of greater potential.

From the 43 squadrons of all-weather, day jet, and conventional aircraft assigned at the end of 1952, the ADC interceptor force was to be built up to 57 squadrons entirely equipped with all-weather aircraft by mid-1954.[104] In an emergency, the ADC force was to be augmented by 52 ANG squadrons, all of which were to be equipped with day jet aircraft by 1955. The 55 battalions of antiaircraft weapons assigned at the end of this period were to be increased to 66 by 1955, of which number nearly half were to be equipped with the surface-to-air guided missile, NIKE, and the remaining battalions with the 75mm, the 90mm, or the 120mm gun.[105] In an emergency, the AAA force was to be augmented by 90 NG battalions, both automatic weapons and gun-equipped.

Under current authorization, the above was the ultimate strength programmed. No definite requirements had been established beyond this. However, at the end of 1952, it was thought that to achieve the necessary destruction of atomic bomb carriers by 1960, there would be a need, exclusive of ANG forces, for at least 151 interceptor squadrons, 3000 surface-to-air missiles of the BOMARC type, and 160 antiaircraft battalions.[106] In addition, it was felt by ADC

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104. ADC, Program, 1 Jan 1953, HRF 900. The 57 squadron strength was to actually be reached by the end of 1953, but this included some day jet squadrons. Conventional aircraft were scheduled to be phased out entirely during the latter half of 1953.

105. As in fn 71.

106. TWX, ADC to USAF, 5 Dec 1952, (Doc 31).

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that specific commitments had to be obtained from all commands and services for emergency utilization of all forces in the United States having an air defense capability.

ADC's 57 interceptor squadrons were to be deployed on 47 bases by mid-1954.[107] Primarily, the planned deployment did nothing more than add to the defense of the three critical target areas: the northeast, the northwest, and California. Also, a few additional isolated targets and vulnerable openings in the nation's defense were to be covered. Additionally, squadrons were to be placed at Great Falls AFB, Montana; Davis-Monthan AFB, Arizona; Walker AFB, New Mexico; Majors AFB, Texas; Houma AFB, Louisiana; Smoky Hill AFB, Kansas; and Hunter AFB, Georgia. The 52 ANG squadrons were scattered quite generally throughout the country with the heaviest concentration in the east. In EADF were located 30 squadrons, in CADF 13 squadrons, and in WADF 9 squadrons.

By 1955, the 66 antiaircraft battalions were to be defending 23 critical targets.[108] These included population and industrial areas, SAC bases, and atomic energy installations. The heaviest concentration of antiaircraft, 10 battalions, was to be around New York City. Next was Washington with six battalions, followed by Chicago with five. Other cities were to have either three or four battalions. Seven SAC bases — Limestone, Carswell, Rapid City, March, Travis, Castle,

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107. As in fn 104.

108. As in fn 71.

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and Fairchild, and the Soo Locks -- were to have one battalion each. The Hanford atomic installation was to have four battalions and Sandia-Kirtland was to be defended in an emergency by the AA battalions located at Fort Bliss, Texas.[109] The 90 NG battalions were to be used in emergency for defense of all 23 critical targets for which regular battalions were programmed and also were to provide emergency defense of ten additional targets.[110] In addition to a number of cities, the latter included the AEC installations at Savannah River, Oak Ridge, Los Alamos, and Sandia-Kirtland, and the SAC bases at Barksdale, Louisiana.

Aircraft programmed for ADC to about 1956 were only improved models of the all-weather aircraft currently in the system plus the all-weather version of the Sabre Jet - the F-86D. The other types were the F-89D and the F-94C.[110] The F-86Ds, with which a majority of the squadrons were to be equipped, and the F-94Cs, were scheduled to begin coming into the system in the third quarter of Fiscal Year 1953. The F-89Ds were to become available first in the third quarter of

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109. As in fn 71.

110. R&R, G3, ARAACOM to Mgt Anal, "Augmentation to Proposed Defense Problem," 19 Dec 1952, (Doc 32).

111. A number of problems remained to be solved with each of these aircraft before they could be successfully operated in the field. At the end of 1952, all F-89s were undergoing many structural changes. Whether these would solve all the deficiencies of the F-89 remained to be seen. The F-94C proved in tests to be difficult to control at low altitudes and at high speeds (TWX, AFFTC to APGC, ADC, 23 Jun 1952, Doc 33). The F-86D, among other problems, was excessively difficult to maintain. The APGC was able to maintain only 20 percent of the F-86Ds in commission over a four-month period and found that forty hours of maintenance was required for each hour of flying time (TWX, APGC to USAF, ADC, 3 Sep 1952, Doc 34).

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Fiscal Year 1954. Through a gradual process of conversion, by the end of calendar year 1954, the interceptor force was to consist of these three types in the following numbers: 44 F-86D squadrons, 6 F-89D squadrons, and 7 F-94C squadrons.

All of the above aircraft were to be armed initially with only the 2.75" rocket. The F-86D would be able to carry 24 rockets; the F-94C, 48 rockets; and the F-89D, 104 rockets. The kill probability of these fighters would be greatly increased over the gun-armed interceptors, with the F-89D being the most lethal because of its greater load of rockets. The ADC Operations Analysts estimated the kill probability of each fighter, operating singly, taking into consideration all of the factors from the point before tally-ho to bomber destruction as follows: F-86D - 18 percent, F-94C - 26 percent, and F-89D - 36 percent.[112]

A much-improved rocket, the GAR-1 (Falcon), with a minimum range of one to two miles and a maximum range of five miles, depending upon such factors as the angle of attack and the altitude, was to be installed on later models of the F-89D.[113] Beginning with the 194th F-89D produced and continuing to the 329th F-89D, equipment was to be installed which would enable these aircraft to be fitted for carrying the GAR-1. All F-89Ds after the 329th were to have the

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112. Mr. R. H. Blythe, ADC COA to Mr. G. Dewey, WSEG, Office of Joint Chiefs of Staff, 24 Oct 1952, (Doc 35).

113. Interview, Historian with Lt Col J. R. Thornton, Jr., ADC P&R, 8 May 1953.

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GAR-1 installed in production. Neither the F-86D nor the F-94C were to be fitted for this rocket, but all subsequent interceptor types were to carry it. With the GAR-1, interceptors were estimated to have a 50 percent kill probability.[114]

In addition to use of the above armament, ADC requested higher headquarters to develop a large unguided rocket (300 pounds gross with a 175 pound warhead), capable of a high kill probability so as to improve the armament of gun and 2.75" rocket-equipped interceptors,[115] ADC wanted all of the interceptors currently in the system, as well as all of the augmentation fighters, to be armed with a rocket of this nature.[116] USAF established a project for development of this rocket, but estimated that it would not be available until about 1957.[117] By this date, all of the day jet and conventional aircraft were to be phased out of the system. Regardless, ADC decided to continue the requirement with a view to using the large rocket as a vehicle for employment of atomic warheads.[118]

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114. As in fn 71, p. 39.

115. ADC to USAF, "Development of a 'Quick Fix' Large Unguided Air-to-Air Rocket (Terror)," 13 Aug 1952, (Doc 36).

116. ADC to USAF, "Program for the 'Quick Fix' Large Unguided Air-to-Air Rocket (Terror)," 4 Dec 1952, (Doc 37).

117. ADC to USAF, "Development of a 'Quick Fix' Large Unguided Rocket," 29 Nov 1952, with 3 Inds, (Doc 38).

118. As in fn 117, 2nd Ind, ADC to USAF, 19 Jan 1953.

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The aircraft programmed for the years to 1956, i.e., the F-86D, F-89D, and F-94C, were capable of speeds ranging from Mach .80 to .93.[119] This was considered to be sufficient only until about the end of 1953. Intelligence estimates placed enemy bomber speeds from late 1953 to 1956 at approximately .83 Mach. Thus, after 1953 none of the interceptors would have more than a ten percent speed advantage, and at least a 25 percent advantage was considered to be necessary against bombers of this speed.[120] It was not until 1956 that an interceptor was programmed for ADC which would have greater speeds. This was the Convair F-102 delta-wing all-weather fighter which would be capable of a maximum speed of 1100 knots.[121]

Because of the great possibility of attack in the period in which ADC interceptors would have only marginal performance advantage over enemy bombers, ADC sought to secure the F-102 at the earliest possible date. The F-102 was actually to be put into production in 1954, but the first models were scheduled for testing purposes only. ADC requested that it be assigned aircraft from the first year's production, even though the difficulties in accepting an aircraft before testing was completed were known (having experienced them with the

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119. ADC to USAF, "Requirement for Increasing Interceptor Capability," 24 Aug 1951, (Doc 39).

120. As in fn 118.

121. ADC, Briefing, Apr 1953, p. 60; USAF to ADC, "Convair Interceptor (F-102)," 20 Dec 1951, (Doc 40).

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119. ADC to USAF, "Requirement for Increasing Interceptor Capability," 24 Aug 1951, (Doc 39).

120. As in fn 118.

121. ADC, Briefing, Apr 1953, p. 60; USAF to ADC, "Convair Interceptor (F-102)," 20 Dec 1951, (Doc 40).

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F-89). It was hoped thereby to gain valuable time and partially alleviate the interceptor deficiencies.[122] Although this proposal was being considered by USAF at the end of 1952, the only definite programming at this time was for nine F-102 squadrons by the end of Fiscal Year 1956.[123]

During the period 1956 to 1960, USAF planners thought that the U.S.S.R. would have medium and heavy bombers available for use against the United States having only subsonic speeds.[124] However, it was believed possible that light bombers with speeds up to Mach 1.2 could be used with refueling. In addition, Russia was developing rockets, which by 1956, it was estimated, would be capable of a 2,160 nautical mile range. By 1957, it was thought that a glide version would have a 4,400 nautical mile range. These missiles were expected to have speeds of approximately Mach 10 at the burn-out point.

Against the Mach 1.2 bomber threat, USAF felt that the F-102 interceptor and the first surface-to-air missile, the F-99 (BOMARC), would be adequate.[125] The normal improvement of these weapons, plus the

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122. As in fn 121, USAF to ADC, "Convair Interceptor (F-102)," 20 Dec 1951.

123. TWX, USAF to ADC, 25 Jul 1952, (Doc 41); TWX, ADC to USAF, 2 Aug 1952, (Doc 42).

124. 1st Ind, USAF to ADC, 23 Sep 1952, to ADC to USAF, "Air Defense Weapons System," 13 Aug 1952, (Doc 43).

125. As in fn 123.

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F-103 manned interceptor, was expected to provide an adequate capability against increases in the threat up to Mach 2. To combat the ballistic missile threat from Mach 2 to Mach 10, no weapons system had been developed by the end of 1952, with the exception of the ultimate F-99 (BOMARC) missile which was established to cope with missiles having speeds up to Mach 2.7. However, a project (WIZARD) had been initiated by USAF to study means of combating the Mach 10 threat.

The ADC surface-to-air guided missiles or unmanned interceptors were to be developed and phased into the air defense system in two stages, with the second being far superior to the first. The first missiles of the F-99 (BOMARC) type were scheduled to be integrated into the system in approximately mid-1956.[126] The ultimate missiles of this type were to become available by early 1958. By 1960, ADC tentatively planned to have about 30 F-99 (BOMARC) squadrons consisting of 100 sites and 3000 missiles.[127]

In addition to the regular high explosive warheads, ADC was planning to arm a small percentage of the F-99 (BOMARC) missiles with atomic warheads.[128] The possibility of using atomic warheads in rockets carried by the F-102 was also being considered. It was estimated

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126. As in fn 122, USAF to ADC.

127. ADC, F-99 (BOMARC) Briefing by Lt Col J. R. Thornton, Jr., P&R, Apr 1953, (Doc 44).

128. USAF to ADC, "Atomic Warhead for Use Against Airborne Aircraft," 18 Apr 1951, with 1 Ind, (Doc 45).

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that nuclear armament, which could cause destruction without a direct hit, would give an 85 to 95 percent kill probability.[129]

The Army Antiaircraft Command was scheduled to begin converting the automatic weapons battalions (five of the eight, to be assigned to the defense of seven SAC bases and Sault Ste Marie, were operational at the end of 1952) to the 75mm gun, "Skysweeper," in about July 1953.[130] The 75mm had its own radar and computer which would provide the all-weather capability that the automatic weapons lacked. The 75mm gun had an effective range of about 19,000 feet and a radar tracking range of about 20,000 yards. Also in 1953, the first AAA surface-to-air guided missile, NIKE, was to be phased into the system.[131] By the fall of 1954, 28 NIKE battalions were expected to be operational and on site at 12 critical target areas. The NIKE missile was to be capable of speeds between Mach 1.2 and Mach 2.5 and to be effective up to 60,000 feet and out to 25 miles.[132]

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129. As in fn 71, p. 39.

130. As in fn 71, p. 40.

131. As in fn 71, p. 40. The TERRIER surface-to-air missile, previously programmed for the ARAACOM, was dropped. ARAACOM, Command Report, 1952, p. 18, (Doc 17).

132. WADF, Briefing, "Mission of the Western Army Antiaircraft Command," 29 Jun 1951, p. 16, HRF 605.

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PART II

MANPOWER AND ORGANIZATION

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CHAPTER THREE

MANPOWER ECONOMIES

I

"It is imperative," General Vandenberg wrote in June 1951, "that the military plan and time-phase its demands upon the total economy so as not to weaken the civilian economy on which the Services depend for continued development."[1] Maintaining a vast defense establishment ready for war over a long period of time as a counter-weight to Soviet military strength imposed a severe burden on the financial and human resources of the nation. In the summer of 1951, the Manpower Requirements Group, known as the Learned Committee, was created at Air Force Headquarters to develop a requirements troop basis that would enable the Air Force to expand its combat strength within the Air Force's share of the limited national manpower pool. The Air Defense Command reorganization of February 1952 followed the mandate of the Learned Report; by eliminating the wasteful Wing-Base plan, the command was able to increase its combat strength without additional authorizations of personnel.[2]

The pressure to economize steadily increased throughout 1952.

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1. USAF Memo, Gen Vandenberg to Deputy Chief of Staff, "Proper Utilization of Resources," 22 Jun 1951, (Doc 46).

2. For discussion of the Learned Report and its relationship to the Air Defense Command reorganization of February 1952, see ADCHR #3, ch iv.

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The Learned Committee had set the military personnel total for a 126 combat wing Air Force at 1,210,000. The Air Defense Command share of that total was 79,246.[3] These figures were pared in the Office of the Secretary of Defense;[4] by August 1952, the Air Force total for the 126 combat wing program had been reduced to 1,155,000, and the Air Defense Command total to 72,202.[5] At the same time, programmed civilian spaces were reduced to a figure so low that Air Defense Command officers considered it scarcely adequate to meet the requirements of the command.[6]

These cuts were accompanied by a sweeping emphasis on efficiency

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3. Report of Manpower Requirements Group, "Manpower Requirements for Expanded Air Force Structure," 19 Mar 1952 (hereafter cited as Learned Report), TAB D, p. 3, (Doc 130, in ADCHR #3).

4. Hqs ADC, Transcript of Briefing for Maj Gen Roger Browne, 12 Aug 1952 (hereafter cited as Browne Briefing), pp. 44-45.

5. OPT 53-1, USAF Operating Program, Organization and Personnel, Aug 1952, pp. 5, 16.

6. USAF to ADC, "Civilian Personnel Requirement Department of the Air Force Fiscal Year 1954 Budget Estimate," 23 May 1952 (Doc 47). ADC to USAF, "Civilian Personnel Requirement in Department of the Air Force Fiscal Year 1954 Budget Estimates," 18 Jul 1952, (Doc 48). See also, EPT 54-1, USAF Planning Budgeting Program, May 1952, pp. 13-14. Of the Air Force personnel ceiling, Brigadier General J. K. Gerhart of the USAF Operations Directorate said in June, ". . . that sounds like a lot of people, and when you see them out sitting around in bars and what not with their caps on the back of their heads you think we probably have at least a million too many, but when one looks at the program of what we have to do to move into the expanded Air Force of 126 combat wings . . . [the ceiling], with the war in Korea, amounts to about a deficit of seventy thousand. Now one might ask, 'well why don't you go back and ask for a greater authorization?' The point remains that there just isn't any manpower pool to support more than that . . . ." [Conference of State Civil Defense Directors, 16 Jun 1952, (Doc 201 in ADCHR #3)].

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in the management of resources and personnel within the Department of Defense. In February 1952, an Air Force wide management improvement program was established. Its objective was to secure "application of the best management practices and procedures to the utilization of our basic resources - funds, materiel, manpower, space, and time - at every echelon of command, in every work situation, by each commander, staff officer, supervisor, airman, and civilian employee."[7] The week before this program was announced, General Chidlaw urged his Defense Force Commanders to indoctrinate their officers with the importance of sound management practices and the economical use of limited resources.[8] In July 1952, a Preparedness Investigating Subcommittee of the Committee on Armed Services of the United States Senate, under the Chairmanship of Senator Lyndon Johnson of Texas, published a report that was severely critical of manpower utilization in the armed services.[9] As a result of the recommendations of the Lyndon Johnson subcommittee, the Department of Defense established a Citizens' Advisory Committee to review manning and equipping tables in the armed forces and to suggest more effective and econo-

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7. AFR 150-7, "Management Improvement Program," 1 Feb 1952.

8. Chidlaw to Maj Gen Frederic H. Smith, Jr., CG EADF, 21 Jan 1952, (Doc 49). Similar letters were sent to the other Defense Force commanders.

9. USAF to ADC, "Comprehensive Manpower Management Studies," 24 Jul 1952, (Doc 50).

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mical ways to use manpower and equipment.[10]

Pressed by the reduced overall personnel ceilings and goaded by the unfavorable publicity surrounding the Lyndon Johnson Committee report[11] and by the expected investigation of the Citizens' Advisory Committee, the Manpower and Organization staff at Air Force headquarters ruthlessly reduced world-wide Air Force unit personnel authorizations. "I have to do some of these things that I am doing -- just to live within these...[ceilings]...," Major General Roger Browne, Director of Manpower and Organization at USAF Headquarters, told Air Defense Command officers in August 1952. "I had to ...precede this civilian committee."[12]

General Browne's staff established "a pattern for austerity" in the manning of specialized functions, particularly indirect support functions. The pattern was expressed in reductions of the manning tables that flowed continually from Washington in the last six months of 1952. Early in July, USAF directed a reduction of forty-two officer spaces in the Air Base Groups of the Air Defense Command.

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10. See USAF to ADC, "The Citizens Advisory Committee to Review Tables of Organization and Tables of Equipment in the Armed Services," 5 Sep 1952, with 1st Ind, ADC to EADF, 17 Sep 1952, (Doc 51). Inclosure 1 to the basic letter is Department of Defense Directive 5120.7 of August 1952 that established the Citizens Advisory Committee.

11. See, for example, Lyndon B. Johnson, "U.S. Air Claws Lack Scratch," The Denver Post, 21 Sep 1952.

12. Browne Briefing, pp. 45, 68.

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The cut was designed to end full time officer assignments in such indirect support fields as Special Services, Personal Affairs, Physical Fitness, and Information and Education.[13] Late that same month, the pattern for austerity was extended to include Defense Wing headquarters. One hundred and thirty-six officer spaces were cut from the Defense Wings although the Wings had been created in the February reorganization on an austerity basis and their strength had been pared voluntarily by the Air Defense Command in the months since organization.[14] The size of Ground Observer Corps Filter Center detachments was reduced from five officers and ten airmen to four officers and eight airmen. This cut was made despite the fact that the Ground Observer Corps had been placed on twenty-four hour operation in July and the Filter Center detachments, which had been established when the Ground Observer Corps was on a standby basis, were clearly unequal to meeting the additional workload that twenty-four hour operations entailed.[15] In August, the number of personnel allo-

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13. USAF to ADC, "Manpower Requirements for Expanded Air Force Structure," 2 Jul 1952, with 1st Ind, ADC to USAF, 15 Jul 1952; ADC, R&R, MRO to DO, 10 Jul 1952, (Doc 52).

14. USAF to ADC, "Manpower Requirements for Expanded Air Force Structure," 31 Jul 1952, and 1st Ind, ADC to USAF, 30 Aug 1952, (Doc 53). Two Defense Wings, the 4703rd at Larson Air Force Base, Washington, and the 4705th at Norton Air Force Base, California, had been eliminated by the Air Defense Command in March in order to divert personnel spaces to other priority functions. See ADCHR #3, p. 168n.

15. ADC to USAF, "Military Manpower Requirements for the Ground Observer Corps," 20 Aug 1952 with 1st Ind, USAF to ADC, 15 Sep 1952, (Doc 54); Statement of Maj Gen Smith in Browne Briefing, p. 64.

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cated to the Inspector General's functional area at Defense Wing headquarters was reduced.[16]

II

Personnel reductions increased rather than abated during the closing months of 1952. "We are receiving almost weekly cuts in our personnel ceiling," Major Robert E. Gotchey of the Air Defense Command Manpower and Organization staff wrote in September. "There is every indication that more cuts will be made in the near future."[17] In September, USAF directed that further reductions in manning standards would be necessary in order to enable the Air Force to accomplish its phased growth to a strength of 126 combat wings. The important thing about these reductions was that functions and missions were not eliminated. The primary mission was to be discharged as before, but with less manpower. This meant assigning personnel to do as additional duties what had been assigned as primary duties previously. In many cases it meant the assignment of non-commissioned officers to do tasks previously performed by commissioned officers.[18] "In order that there will be no misunderstanding with respect to the past and future application of austere manning standards in indirect

16. USAF to ADC, "Manpower Requirements for Expanded Air Force Structure," 13 Aug 1952, with 1st Ind, ADC to USAF, 24 Aug 1952, and 2nd Ind, USAF to ADC, 1 Oct 1952, (Doc 55).

17. 2nd Ind, ADC to WADF, 17 Sep 1952, to 25th Air Div to WADF, "Change in T/O Authorization for the 737th Squadron," 15 Aug 1952, HRF 209.

18. TWX, USAF to ADC, 9 Sep 1952, (Doc 56).

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support functional areas," USAF directed in September, "it is emphasized that the reductions are not to be interpreted as eliminating functions.... Subject reductions are possible through the use of minimum personnel within functions, the assignment of additional duties to officers and the delegation of greater responsibilities to non-commissioned officers."[19]

In this atmosphere of retrenchment, it was not surprising that the Pentagon turned a deaf ear to urgent requests for additional personnel to meet new requirements. One of the results of the widespread congressional and public dissatisfaction with Armed Forces management practices was a bill introduced into Congress in the first part of 1952 to transfer control over all non-Table of Organization equipment in the Zone of the Interior from the Armed Forces to the General Services Administration. In order to forestall this action, the Secretary of Defense set in motion a program of better equipment utilization. In May 1952, an Air Force regulation directed the establishment of teams at major command level to survey documents authorizing the issue of equipment in order to eliminate unnecessary equipment, reduce authorizations of rarely used equipment, and to ascertain if low cost equipment could be substituted for higher cost equipment.[20]

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19. ADC to HADF, "Manning Standards in Indirect Support Functional Areas," 26 Sep 1952, (Doc 57). See also TWX, USAF to All Major Commands, 14 Oct 1952, (Doc 58) for statement that the cut of ground safety officers at wing and base level did not, by any means, indicate that the ground safety function was to be eliminated.

20. AFR 150-8, "Equipping Documents Survey Function and Survey Teams," 12 May 1952; ADCR 150-2, "Equipping Documents Survey Function and Survey Teams," 30 Oct 1952.

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This directive imposed a considerable additional workload and required the full time assignment of a number of officers and airmen. When General Vandenberg had presented the Learned Report to the Air Force Commanders he had stated that if new workloads were assigned from Washington, either other workloads would be deleted or additional manpower would be furnished.[21] Now when the Air Defense Command requested the authorization of thirty-nine additional officers to perform the documents survey function, the request was denied. The survey of equipping documents would have to be performed by using existing personnel.[22]

Many other requests for additional authorizations were refused. Alarmed at the impending release from active duty of 10,000 odd Air National Guardsmen assigned to Air National Guard fighter-interceptor squadrons scheduled for reversion to State control in November and December 1952, the Air Defense Command asked for a temporary twenty percent increase in airmen authorizations. It was particularly important that the Command be authorized technicians in the aircraft maintenance field to compensate for the anticipated loss of skilled

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21. "I am instructing my Staff to give you a decent break," the Chief of Staff had said. "When they add to your workload they should either delete some other requirement so that you can absorb the load, or they should furnish extra manpower spaces." [Learned Report, TAB C, Attachment 1, p. 1].

22. ADC to USAF, "Equipping Documents Survey Function," 13 Aug 1952, (Doc 59); ADC to EADF, "Implementation of Provisions of AFR 150-8," 27 Sep 1952, (Doc 60); ADC to USAF, "Progress on Implementation of Provisions of AFR 150-8," 17 Oct 1952, (Doc 61).

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Air National Guardsmen. Despite personal appeals by Major General Frederic H. Smith, Jr., Air Defense Command Vice Commander, to Major General John H. McCormick, Director of Military Personnel, and to General Browne, Director of Manpower and Organization, at Headquarters, United States Air Force, the USAF staff replied that the Air Force personnel ceilings would not permit even a temporary increase in airmen authorizations.[23]

In September, USAF refused to grant additional spaces for a food service squadron and an air transport squadron,[24] and restricted the number of airmen that would be authorized to man the new giant installation under construction at Grandview Airport in Kansas City.[25] The budgetary and manpower restrictions moved the Air Defense Command staff, in November 1952, to consolidate the programming activity that had previously been accomplished by a number of staff agencies under a specialized Office of Assistant for Programming. Despite the significant improvement in management that this innovation promised, USAF refused to grant any increase in officer and civilian spaces. It was

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23. ADC to USAF, "Request for Increased Authorization and Manning in Critical AFSC's," 21 Jun 1952, and 1st Ind, USAF to ADC, 19 Jul 1952, (Doc 62); Gen Smith to Gen McCormick, 21 Jun 1952; Gen Smith to Gen Browne, 21 Jun 1952, (Doc 63).

24. 1st Ind, USAF to ADC, 3 Sep 1952, to ADC to USAF, "Reorganization of the 566th Food Service Squadron," 12 Aug 1952, (Doc 64). [ADC Diary, 10 Sep 1952]

25. TWX, ADC to CADF, 30 Sep 1952, (Doc 65).

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necessary to squeeze spaces from other activities to man the programming office.[26]

III

The critical manpower stringency and the Pentagon's refusal to grant increased authorizations threatened the success of two projects that the Air Defense Command staff deemed essential to increasing the kill potential of the air defense system. Air Defense Command officers had long planned to compensate for the lack of early warning at low altitudes seaward of targets on the East and West Coasts of the United States by establishing patrols of radar equipped aircraft to fly over the ocean and give warning of approaching aircraft. This project, which had been approved in Washington, involved a tremendous investment in multi-engine aircraft and electronic gear.[27] In the summer of 1952, there was an urgent need for a few officers to coordinate progress with the Navy, the Air Materiel Command, and the Lockheed Aircraft Company, manufacturers of the super-Constellation aircraft with which the Airborne Early Warning groups were to be equipped. Yet the Air Defense Command's request for six officer spaces for this purpose was refused. "That sort of floored us," said General Bergquist, Air

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26. ADC to USAF, "Increased Personnel Authorization," 19 Nov 1952, with 1st Ind, USAF to ADC, 15 Jan 1953, (Doc 66).

27. For an account of the Airborne Early Warning project, see ch vii. See, ADC to USAF, "Airborne Early Warning Proposed T/O's," 31 May 1952, (Doc 67) for Air Defense Command's proposal to man the airborne early warning organization.

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Defense Command Deputy for Operations.[28]

The second vital project was the establishment of an Air Defense Command Weapons Training Center utilizing the Williams Bombing and Gunnery Range at Yuma in the Arizona desert. There fighter-interceptor crews might develop greater proficiency in the final vital skill necessary to the success of the entire air defense mission. Maintenance of the Yuma Gunnery Training Center was estimated to require a personnel authorization of 1,449.[29] Both the Airborne Early Warning and the Yuma projects were new requirements that had not existed when Dr. Learned and his Committee established their manning totals; both were vital to the developing operational effectiveness of the Air Defense Command. Yet, as the time for realization of the two projects approached, there was every indication that the necessary officers and men required to man them might not be authorized by USAF.[30]

The Air Defense Command staff strained to find spaces to meet these critical requirements from within the Command's own resources. The Defense Forces were urged to review methods of operation in all activities to find places where savings might be effected.[31] In July,

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28. Browne Briefing, p. 30.

29. Browne Briefing, p. 12.

30. Early in July, USAF indicated a study was being made of the manpower requirements for the Yuma Gunnery Training Center and the Airborne Early Warning groups. TWX, USAF to ADC, 7 Jul 1952, (Doc 68).

31. 1st Ind, ADC to WADF, 6 May 1952, to WADF to ADC, "Tables of Distribution-Augmentation Change Requests," 28 Apr 1952, (Doc 69).

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an effort was made to save airmen by applying a standard formula for airmen authorizations at Air Defense Control Centers based on the number of plotter teller lines installed at each Control Center.[32] That same month, thirty-four officer and sixty-eight airmen spaces were saved by eliminating inspection personnel at base level.[33] In October, the Air Defense Command eliminated the intelligence officers at Wing level and shaved a number of spaces from the personnel assigned to the Deputy Chief of Staff for Materiel at Air Division headquarters.[34]

By making these cuts, the Air Defense Command staff hoped to find spaces to use in other activities that were deemed more important to the success of the air defense mission. Of these, the Yuma Weapons Training Center was regarded as the most immediate requirement. When

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32. ADC to CADF, "Manpower Utilization," 12 Jul 1952, (Doc 70). Similar letters were sent to the other Defense Forces. See WADF to ADC, "Manpower Utilization," 19 Aug 1952, (Doc 71) for the objections of one Defense Force to the Air Defense Command formula.

33. ADC to USAF, "Reorganization Under T/O 1-8029T," 18 Jul 1952, (Doc 72).

34. ADC to EADF, "Elimination of Wing Intelligence Officer," 21 Oct 1952, (Doc 73); ADC to EADF, "Reduction Personnel Authorizations in DCS/M at Air Division Level," 29 Oct 1952, (Doc 74). An effort was made to avoid the discharge of civilian employees in personnel reductions unless absolutely necessary. See ADC to CADF, "Civilian Employment," 8 May 1952, (Doc 75).

The Air Defense Command staff critically examined requests for additional personnel forwarded by the Defense Forces. Thus, when Eastern Air Defense Force requested one additional officer and sixteen additional airmen to man its combat operations center, the reply was that the additional spaces would have to come from within already authorized resources. EADF to ADC, "Personnel Authorization for Combat Operations," 10 May 1952, with 1st Ind, ADC to EADF, 17 May 1952, (Doc 76). Similar replies were made to other requests from the Defense Forces. See, for example, 1st Ind, ADC to WADF, 6 May 1952, to WADF to ADC, "Tables of Distribution-Augmentation Change Requests," 28 Apr 1952, fn 31.

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USAF initiated reductions in personnel authorized Air Defense Command units, the Air Defense Command staff assumed that the saved spaces would be made available for use on higher priority projects elsewhere in the Command.[35] "When you generate new requirements regarded by you of high priority," General Vandenberg had said, "I expect you to delete items of low priority within your command."[36] This clearly implied that spaces could be transferred from low to high priority projects.

Unfortunately, this expectation was not realized. When the Air Defense Command initiated cuts in the strength of its units, instead of permitting the saved spaces to be shifted to other functions of higher priority, the Pentagon withdrew the spaces and the authorized strength of the command was reduced. When USAF initiated personnel cuts, the spaces were also taken away from the Air Defense Command. As a result, the attempts of the Air Defense Command to meet its new requirements by sacrificing functions of low priority in the spirit of the Learned Report resulted only in making the manpower stringency more critical than it had been before.

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35. USAF had made it clear that any increase in authorization for Table of Organization units would be accompanied by a corresponding decrease in the non-Table of Organization strength of the Air Defense Command. The Air Defense Command staff interpretated this to mean that if there were a decrease in Table of Organization strength, it would be accompanied by an increase in the non-Table of Organization allotment. [ADC to USAF, "Reorganization Under T/O 1-8029T," 18 Jul 1952, as in fn 33].

36. Learned Report, TAB C, Attachment 1, p. 6.

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IV

As a result of the personnel cuts and the refusal of the USAF staff to give favorable consideration to requests for increased personnel authorizations, there was an ever widening breach between the conception of essential air defense requirements held in Colorado Springs and the conception held in Washington. Air Defense Command officers were most concerned about the unfilled requests for personnel for the Airborne Early Warning groups, the Yuma Weapons Training Center, and the Ground Observer Corps. There were a number of less important requirements that had also not been fulfilled. By August, the difference between the strength of the Air Defense Command as programmed by the Air Defense Command and the strength as programmed by USAF was estimated to be no less than 4,925 spaces. "In resolving these 4,925 spaces either USAF or ourselves will have to change our ways of thinking," said Colonel Oliver G. Cellini, Air Defense Command Director of Manpower and Organization. "It is very obvious to us that we cannot take them all out of our hide. Our hide is terribly thin right now."[37] The situation would have to be resolved if the Air Defense Command was to continue its planned increases in defensive capability, increases that were vital to the security of the nation. Early in August, Major General Smith wrote General Chidlaw that "We must be prepared soon to go to Washington for a showdown fight on our troop basis."[38]

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37. Statement in Browne Briefing, p. 33.

38. ADC, R&R, Smith to Chidlaw, 4 Aug 1952, (Doc 77).

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On the 12th of August, 1952, the Air Defense Command staff was presented with an opportunity to state its case for the increased personnel authorizations it deemed essential when General Roger Browne and key officers from the USAF Manpower and Organization Directorate visited Colorado Springs. The important Yuma, Airborne Early Warning, and Ground Observer Corps requirements were described to General Browne and it was made clear that each of these projects had been approved in Washington. The highest ranking officers of the Command told General Browne that every effort had been made to find spaces for these projects within existing resources:[39]

> Gen Bergquist: We scamper around and try to salvage some spaces in order to try to put it in a higher priority like Yuma----
>
> Gen Smith: (Interposing) Which we were assured we could do.
>
> Gen Bergquist: Right. But what happens is that we cut out the function, and you immediately pull the spaces away from us.
>
> Gen Browne: I am embarrassed enough now.

Before the briefing was over, General Browne had promised not to cut spaces when the Air Defense Command was attempting to transfer personnel from low to high priority functions. He also suggested that the Air Defense Command probably would receive personnel for the Yuma, Airborne Early Warning, and Ground Observer Corps projects. "I will get -- and you will get your ... people, I am sure -- but I'll have to take it from somebody else, because I think you have a valid requirement," General Browne said. "The only proposition

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39. Browne Briefing, p. 35.

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is I have to sell it to the Air Force Council as to who gets the cut.[40] You will get them. It will be a bitter fight.

In the weeks that followed General Browne's visit, there was a limited easing of the manpower squeeze in certain areas. The six officer spaces for the Airborne Early Warning project were authorized.[41] USAF found it impossible to grant additional officers for the Ground Observer Corps Filter Center detachments, but sixty-one airmen of the first three pay grades were authorized in lieu of the officers, and one hundred and sixteen additional airmen were authorized as well.[42] An urgent Air Defense Command requirement was met when four airmen were authorized to staff alert centers at each fighter-interceptor squadron.[43] In the USAF planning and budgeting document published on the 1st of January 1953, the Air Defense Command personnel ceiling for the end of Fiscal Year 1955 was increased by some 4,000 spaces, and in an amendment to that document published in March 1953, the Airborne Early Warning Groups and the Yuma Weapons Training Center were, for the first time, programmed near the strengths that the Air

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40. Browne Briefing, pp. 50, 64.

41. USAF Non-T/O Military Personnel Allotment Voucher No. 21, 26 Aug 1952.

42. ADC to USAF, "Military Manpower Requirements for the Ground Observer Corps," 20 Aug 1952, with 1st Ind, USAF to ADC, 15 Sep 1952, as in fn 15.

43. 1st Ind, USAF to ADC, 17 Oct 1952, to ADC to USAF, "Table of Organization Change," 14 Aug 1952, (Doc 78).

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Defense Command deemed necessary.[44]

Air Defense Command officers could, however, draw scant comfort from this increase in programmed authorizations. In November, the victory of the Republican party, pledged to reduce government expenditures, promised severe cutbacks in military equipment, manpower, and money.[45] There was early indication that the Citizens' Advisory Committee would recommend a drastic cut in military manpower; when the Committee reported in February 1953, it recommended a cut of no less than ten percent in the size of the nation's armed forces and in the defense budget.[46] It was clear that the Air Defense Command would shortly be faced with the necessity of reevaluating its entire program and organization in terms of strikingly reduced manpower figures. The size and capability of the air defense force would be measured not by the magnitude of the threat but by the resources that the American people, speaking through an economy minded Republican President and Congress, were willing to invest in military security.

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44. EPT 55-1, USAF Planning Budgeting Program, Organization and Personnel, January 1953, with correction dated 20 Mar 1953.

45. See, for example, Hanson Baldwin's article in The New York Times, 12 Feb 1953.

46. The New York Times, 19 Feb 1953.

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CHAPTER FOUR

AIR DEFENSE ORGANIZATION IN TRANSITION

I

Two aspects of the Air Defense Command reorganization of February 1952 had been approved in the Pentagon with reservations. One of these aspects was the split in responsibility that resulted from establishing fighter-interceptor squadron commanders and support unit commanders on equal echelon. As a result of this arrangement there was no single voice of authority at each base. The other aspect was the assignment of all units in five sectors directly to the Air Divisions. As a result of this arrangement five Air Division commanders exercised a unified control over all the weapons of air defense in their sectors. The Air Defense Command was permitted to experiment with the split in authority at the bases and the concentration of authority in the five Air Divisions for a five month period.[1]

In four of the five sectors in which all units were assigned directly to the Air Divisions, there were few or no fighter-interceptor squadrons and the unified control exercised by the Air Division commander had little significance. In the 31st Air Division sector, however, there was a substantial fighter-interceptor force. The 31st

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1. ADCHR #3, pp. 176-179, pp. 181-183.

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Air Division sector was, therefore, the laboratory in which concentration of control in the hands of one commander could receive a practical test and the experiment in concentration of control became known as the 31st Air Division experiment.

Actually, three distinct organizational arrangements were tested in the 31st Air Division experiment. The most important of these was the concentration of complete command responsibility for all of the elements of air defense within a sector in a single headquarters and in a single commander.[2] Since 1948, the tendency had been to free the operational commander of as many other command responsibilities as possible so that he could devote himself entirely to operational matters. The result was a division of authority over fighter-interceptor squadrons in which the Air Division commander controlled operations and the fighter-interceptor Wing commander (after February 1952, the Defense Wing commander) controlled administration, training, and logistics. This divided authority was contrary to the time and battle tested axiom that an operational commander ought to have control over all the elements contributing to the effectiveness of operational units. In the 31st Air Division experiment, the 31st Air Division commander was given this control. The question was whether he could control administration, training, and logistics, without sacrificing some of his ability to control operations.

The second arrangement tested was the assignment of a large

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2. ADC to CADF, "Organization Test, 31st Air Division," 27 Feb 1952, (Doc 79).

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number of units to Air Division headquarters without intervening echelons of command. The absence of any headquarters between the squadrons and the Division meant a significant saving in manpower in accordance with the goal of the Air Force austerity troop program. Under the organization existing before February 1952, the 31st Air Division had only one unit assigned directly to it, an AC&W group. The fighter-interceptor squadrons had been assigned to fighter-interceptor wings and the AC&W squadrons to the AC&W group. In the February 1952 reorganization, both the wings and the group were abolished in the 31st Air Division sector. This resulted in the assignment of twenty-four units directly to Division headquarters.[3] None of these were headquarters units and all were of squadron size. This was a radical deviation from the standard military practice of assigning no more than seven units direct to any headquarters - Brigadier General Thomas C. Darcy, commanding the 31st Air Division, termed the assignment of so many units to his Division headquarters "a somewhat revolutionary idea."[4] Thus, not only was this a test of

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3. ADC to CADF, "Organization Test, 31st Air Division," 27 Feb 1952, as in fn 2. The twenty-four units comprised six fighter-interceptor squadrons, eleven AC&W squadrons, four air base squadrons, a ground observer squadron, a WAF squadron, and an Air Force band.

4. 31st Air Div to CADF, "Organizational Test 31st Air Division," 12 Jun 1952, with 1st Ind, CADF to ADC, 14 Jun 1952, and 2d Ind, ADC to CADF, 27 Jun 1952, (Doc 80). The idea was actually not new. A study prepared under the aegis of the Manpower Evaluation Board of the Continental Air Command at the end of 1950 had questioned the basis of the standard military preference for limited spans of control and had recommended abolition of the fighter-interceptor Wing-Base structure and institution of direct relations between squadrons and Wings. See Sigmund J. Montgomery, "Organization of the Air Force Fighter Wing for Air Defense Operations," no date, [ca. Jan 1951], in HRF.

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whether Headquarters, 31st Air Division was able to control administration, logistics, and training, without detracting from the effectiveness of its control over operations, but it was also a test of the Division headquarter's ability to control an unusually large number of units assigned directly to it.

The third organizational arrangement tested in the 31st Air Division experiment was the split in authority between tactical and support unit commanders at base level. This arrangement was not unique within the 31st Air Division sector. After the February 1952 reorganization, all fighter-interceptor bases under command jurisdiction of the Air Defense Command were organized in that fashion. As the 31st Air Division was an experimental area, however, it was convenient to examine the results of the split in authority at the bases somewhat more closely there than within other Air Division sectors.

II

The 31st Air Division test was approved by USAF as a five months trial, but actually barely four months elapsed between the beginning of the test and submission of the final report on the results.[5] This was scarcely an adequate period in which to evaluate so striking a departure from the established pattern of air defense organization, particularly as the early effects were obscured by the dislocations

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5. The command-wide reorganization was effective on 8 February. On 27 February, Air Defense Command headquarters issued a detailed directive on the purposes of the test. The final report of the 31st Air Division was dated 12 June.

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attendant on the command-wide reorganization.[6] Yet the final report of Headquarters, 31st Air Division dealt boldly with each of the three main questions that it was the purpose of the test to answer.

When the test was over, the consensus of opinion at 31st Air Division, Central Air Defense Force, and Air Defense Command, Headquarters was that it was both desirable and feasible to give command control over all the weapons of air defense in one area to the Air Division commander. General Darcy had succeeded in controlling administration, training, and logistics without detracting from the effectiveness of his control over operations. Concentration of responsibility for the operation and training of fighter-interceptor squadrons in his hands had been particularly valuable in increasing operational effectiveness. Concentration of responsibility for operations, logistics, and administration, for fighter-interceptor and AC&W squadrons in his hands had simplified the solution of logistical problems.[7] "The outstanding fallacy of the previous organization was the divided responsibility for operational command and for administrative and logistical command...," General Darcy wrote. "This abnormal and unhealthy situation has been eliminated by the reorganization with a resultant increase in overall effectiveness in operational, adminis-

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6. 31st Air Div to CADF, 12 Jun 1952, as in fn 4. 31st Air Div, Organization Test Report, 12 Jun 1952, in HRF; See also, History of Central Air Defense Force, 1 Jan-30 Jun 1952, pp. 51-52.

7. 1st Ind, CADF to ADC, 14 Jun 1952, to 31st Air Div to CADF, "Organizational Test 31st Air Division," 12 Jun 1952, as in fn 4.

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trative and logistical matters and in a considerable savings of personnel."[8]

The 31st Air Division fighter-interceptor squadron commanders were particularly enthusiastic about what they deemed to be an increase in their operational effectiveness. The spoke of "increased efficiency," of the "coordination within one headquarters of operational flying requirements with personnel and material capabilities," of the "direct, clear-cut command and operational channels essential to the successful conduct of the air defense mission," and of the way that "morale of personnel.../had/ raised appreciably because of the increased responsibility under a single commander."[9]

The results of the experiment in wide span of control were less clear. General Darcy thought that his headquarters had been successful in exercising direct control over the twenty-four assigned units; observers at Air Defense Command Headquarters were not so sure. The Air Division headquarters had had to deal with many matters previously handled at Wing or Group level and there had been a marked increase in the workload on the headquarters staff. During the three months, November 1951 through January 1952, the average monthly total of correspondence and electrical messages sent and received at Division

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8. 31st Air Div to CADF, "Organization Progress Report," 3 May 1952 with 1st Ind, CADF to ADC, 22 May 1952, (Doc 81).

9. Comments on the reorganization by fighter-interceptor squadron commanders are found in 31st Air Division, Organization Test Report, TAB H.

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headquarters had been 4,400 pieces. In February 1952, the month of reorganization, 10,583 pieces were handled, and in March, 13,195 pieces.[10] Similarly, the number of publications issued by 31st Air Division headquarters increased almost three fold.[11] This substantial extra workload was handled by the institution of rigid controls over correspondence and messages and by increasing the efficiency and the pace of headquarters business.[12] "The present organization is austere and requires full time productive work from each individual," the final report of the 31st Air Division read. "It is a jet league in which there is no place for horse-drawn individuals."[13]

The principle advantage of the wide span of control was the

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10. TAB P to 31st Air Div, Organization Test Report, 12 Jun 1952, 31st Air Div to CADF, "Organization Progress Report," 3 May 1952, as in fn 8.

11. It was probable that although the correspondence load at Division level had grown tremendously, elimination of intermediate echelons had resulted in a decrease in the number of letters and messages in the Division as a whole. Comment of O&T Directorate, Hq, 31st Air Div, in 31st Air Div, Organization Test Report, TAB G. p. 1. Twenty-one of the twenty-four units assigned directly to air division headquarters were of three different types - fighter-interceptor squadrons, air base squadrons, or AC&W squadrons. A significant part of headquarters communications related to all units of a similar type, and involved preparation of a number of copies of the same letter or message with a different address on each. 31st Air Div to CADF, "Organization Progress Report," 3 May 1952, and 1st Ind, CADF to ADC, 22 May 1952, as in fn 8.

12. It was thought in Headquarters, Central Air Defense Force, that the increase in correspondence and in publications was abnormally large because of the readjustments following reorganization. 1st Ind, CADF to ADC, 22 May 1952, to 31st Air Div to CADF, 3 May 1952, as in fn 8.

13. 31st Air Div, Organization Test Report, p. 9.

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direct contact between Division staff and operational units resulting from the lack of intermediate echelons.[14] One fighter-interceptor squadron commander estimated that three to ten days were saved in the time required for a piece of correspondence to travel from Division to squadron and back again.[15] The Division staff gained a better insight into the problems of the squadrons, problems that they had only learned of through channels before.[16] Some matters were uncovered that had previously been completely obscured by intermediate headquarters.[17]

Headquarters, 31st Air Division, was unable, however, to supervise the squadrons in the intensive fashion that the Group and Wing headquarters had supervised them in the pre-February organization. The Air Division staff attempted to substitute written communications and directives for the personal supervision that they were unable to give.[18] The relative freedom from inspection and supervision by higher headquarters undoubtedly contributed to the popularity of the

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14. See comment of O&T Directorate, Hq, 31st Air Div, in 31st Air Div, Organization Test Report, TAB G, p. 1.

15. This was the commanding officer of the 126th Fighter-Interceptor Squadron. 31st Air Div, Organization Test Report, TAB H, p. 2.

16. 31st Air Div to CADF, "Organization Progress Report," 3 May 1952, as in fn 8.

17. 31st Air Div, Organization Test Report, TAB G, p. 6.

18. ADC Memo, Col Thomas D. DeJarnette to VC, "31st Air Division Test Organization," 16 Jul 1952, (Doc 82).

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new organization among the fighter-interceptor squadron commanders. "This reduction in control and supervision has given the squadron a certain freedom of action that has not been enjoyed by similar units over the past few years and which, from the squadron viewpoint, is highly desirable," wrote the commanding officer of the 179th Fighter-Interceptor Squadron. "One result is that squadron personnel attempt to solve their own problems rather than going to higher headquarters for decision in each case."[19]

Some of the Air Defense Command staff officers who visited the 31st Air Division agreed with General Darcy that the large span of control presented no insuperable obstacle,[20] but other observers thought the Division's operational effectiveness had suffered.[21] The increase in the Air Division headquarters' knowledge of squadron affairs was not sufficient in the eyes of these critics to compensate for the supervisory vacuum caused by elimination of the Groups and Wings. Certain of the 31st Air Division's squadrons had either misinterpreted or not complied with important operational directives issued by Air

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19. 31st Air Div, Organization Test Report, TAB H, p. 5.

20. ADC, R&R, Lt Col Arnit W. Lewis, Chief, Non-T/O Div, to VC, "Visit to 31st Air Division, 10 Jul 52, by M&O Personnel," 16 Jul 1952, (Doc 83).

21. ADC, R&R, Lt Col William D. Harris to VC, "Service Test of 31st Air Div Organization," 15 Jul 1952; ADC, R&R, Gen C. D. Vincent, DM, to M&O, 17 Jul 1952, (Doc 84); Col John C. Horton, DCS/P, to M&O, "Organization of the 31st Air Div," 16 Jul 1952, (Doc 85); see also ADC Memo, Col Thomas D. DeJarnette to VC, 16 Jul 1952, as in fn 18.

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Defense Command Headquarters, a failure that was ascribed to lack of close supervision.[22] Brigadier Generals Bergquist and Vincent, Deputies for Operations and Materiel at Air Defense Command Headquarters, regarded inadequate supervision as a cardinal defect in the test organization.[23] That was the view that was adopted officially in the final report on the test forwarded to Washington.[24] "I picked out the 31st to try this service test, because I believed at that time we could eliminate some headquarters," General Chidlaw told General Vandenberg in August 1952. "Now I have found out that we overshot entirely on that."[25]

The third aspect of the experiment in the 31st Air Division area -- the split in authority at fighter-interceptor bases -- was the only one that provoked objection from participating units. Criticism of this split authority came from the Division's four air base squadrons. The air base squadron commanders were dissatisfied with a position of equal status with the units that it was their responsibility to support. They felt that they did not have authority com-

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22. ADC Memo, Col DeJarnette to VC, 16 Jul 1952, as in fn 18.

23. ADC, R&Rs, DO to VC, 18 Jul 1952, (Doc 86). DM to VC, "Service Test of 31st Air Division Organization," 17 Jul 1952, as in fn 21.

24. 31st Air Division Organization Test, (Doc 87). This document was sent as Incl 1 to ADC to USAF, "31st Air Div Organization Test Results," 27 Aug 1952.

25. Transcript of ADC Briefing for Gen Vandenberg, 11 Aug 1952, p. 49, in HRF.

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mensurate with their responsibility; they wanted a measure of control over the operating squadrons.[26] One air base squadron commander pointedly noted that unity of command was just as important at base level as it was at Division level. A consistent organization, he thought, would give the air base commander command control over both support and tactical units, leaving, of course, direct operational control to the Air Division.[27]

The air base squadron commanders evidently felt that the new organization signified a deterioration in position and perhaps in prestige, for support elements. Not only were the air base squadrons on equal organizational footing with the fighter-interceptor squadrons, but, with the Wings gone, resolution of differences at the bases was in the hands of the Air Division, an organization whose past character as an operational headquarters made it more sensitive to the problems of operational than support units. On the other hand, the position of the fighter-interceptor squadrons as co-equal partners at the bases, rather than submerged three echelons beneath Group and Wing, gave them a new prestige. It was small wonder that they were enthusiastic about the experimental organizational structure while the support unit commanders were not.[28] The new organization, said the commanding officer

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26. Comments of the air base squadron commanders are found in TAB J, 31st Air Div, Organization Test Report.

27. Comment of commanding officer of the 79th Air Base Squadron at Sioux City Municipal Airport, Iowa, in 31st Air Div, Organization Test Report, TAB J, p.5.

28. 31st Air Division Organization Test, as in fn 24.

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of the 163rd Fighter-Interceptor Squadron, gives the "combat element the prestige necessary to demand required services."[29]

To the staff at Headquarters, Air Defense Command, the 31st Air Division test demonstrated that unified control over operations, administration, training, and logistics, was desirable and feasible in the air defense system. The Air Division was the logical repository for this unified authority, but it could not exercise direct command over all the operating units. No matter how desirable it might be to eliminate intermediate headquarters and save manpower and funds, there had to be somebody that could perform close supervisory functions essential to creating and maintaining a high standard of operational effectiveness. The test results also demonstrated that unified command was desirable on fighter-interceptor bases. "The presence of two commanders on a station in an equal status," the Air Defense Command comment on the test read, "tended to create some friction in lack of proper administration of base responsibilities as it placed reliance on cooperation and good will, rather than on command control."[30] In short, the experience of the 31st Air Division, as interpreted at Air Defense Command Headquarters, confirmed the merit of the traditional military concepts of concentration of authority and responsibility, and limitation of span of control.

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29. 31st Air Div, Organization Test Report, TAB H, p. 6.

30. 31st Air Division Organization Test, p. 5, as in fn 24.

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III

While the 31st Air Division experiment was in progress, the Air Defense Command staff was grappling with a situation existing at medium size fighter-interceptor bases over the nation. This situation was related to the split authority at the bases and, less directly, to the span of control by the next higher echelon of command. An Air Base Squadron was adequate to support a fighter-interceptor squadron on a small base, and an Air Base Group was adequate to support a fighter-interceptor squadron or squadrons on a large base, but neither the Squadron nor the Group was adequate to support a medium size base with a population of approximately one thousand people.[31] This difficulty had been anticipated before the February reorganization. The Air Defense Command staff had originally proposed to operate all bases with non-Table of Organization support units, each individually tailored for conditions at its particular location, until three distinct Tables of Organization could be developed for small, medium and large bases. The USAF desire for immediate standardization had resulted in premature adoption of Tables of Organization for an Air Base Squadron and an Air Base Group.[32] "They [USAF] are forcing us into a T/O&E for an Air Base Squadron," Major General Frederic H. Smith, Jr., had said at the Air Defense Command commanders' conference of October

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31. ADC to EADF, "Proposed Air Base Group T/O&E's," 29 Feb 1952, with 1st Ind, EADF to ADC, 25 Mar 1952, (Doc 88). Similar letters were sent to the other air defense forces. See 1st Ind, WADF to ADC, 24 Mar 1952, (Doc 89).

32. Draft briefing on air defense organization, prepared in ADC, M&O Directorate, no date [ca. Aug 1952], in M&O files.

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1951. "How are we going to take care of the difference between the Squadron at Dover and the Squadron at Greater Pittsburgh?"[33]

Both small bases, like Dover Air Force Base, and medium size bases, like Greater Pittsburgh Airport, were supported by Air Base Squadrons in the February reorganization. Differences in requirements were met by augmenting the strength of the Air Base Squadrons with non-Table of Organization personnel. In this way, certain squadrons were swollen to almost twice their basic Table of Organization strengths. The 72nd Air Base Squadron at Minneapolis-St. Paul International Airport, where there were a Continental Air Command Air Force Reserve Training Center and a Military Air Transport Service weather detachment in addition to a fighter-interceptor squadron, had an authorized strength of no less than 978.[34] The Air Base Squadron at Presque Isle Air Force Base in Maine was almost as large. This was obviously more men than a squadron commander could control and supervise effectively.[35] The commander of a squadron of that size was so burdened with administrative work that he had little time to devote to operating the installation and servicing the tactical unit or units.[36] "I

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33. Transcript of ADC Commanders' Conference, 15 Oct 1951, p. 88, in HRF.

34. 31st Air Div, Organization Test Report, p. 5.

35. 1st Ind, CADF to ADC, 22 May 1952, to 31st Air Div to CADF, 3 May 1952, as in fn 8.

36. 1st Ind, EADF to ADC, 25 Mar 1952, to ADC to EADF, 29 Feb 1952, as in fn 31; ADC to USAF, "Proposed Air Base Group TO's," 28 Aug 1952, (Doc 136 in ADCHR #3).

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came to the very definite conclusion," said Colonel Carl Elver of the Manpower & Organization Directorate at Headquarters USAF, after a visit to Presque Isle in the summer of 1952, "that so far as that Squadron was concerned it was running after a fashion because of the fact you had a damn bright young Lieutenant Colonel running it."[37]

Experience showed that approximately four hundred persons was the largest number that could be managed by one squadron commander.[38] Spurred by the unwieldiness of the swollen Air Base Squadrons, the Manpower and Organization staff at Air Defense Command Headquarters proposed a new Air Base Group with two squadrons as a medium size support organization suitable for installations where the responsibilities were too onerous for an air base squadron but not onerous enough to warrant establishment of an eight squadron Air Base Group.[39] In time, the small Air Base Group not only seemed to provide a solution to the problem of the over-sized support squadrons, but also a way to end the split in authority at Air Defense Command fighter-interceptor bases. The Air Defense Command Headquarters staff began to think of establishing an Air Base Group at <u>every</u> base and of placing

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37. Transcipt of ADC Briefing for Gen Browne, pp. 57-8, in HRF.

38. 1st Ind, 31st Air Div to CADF, 8 Apr 1952, to CADF to 31st Air Div, "Proposed Air Base Group T/O&E's," 26 Mar 1952, (Doc 90).

39. ADC to EADF, "Proposed Air Base Group T/O&E's," 29 Feb 1952, as in fn 31; CADF to 31st Air Div, 26 Mar 1952, as in fn above.

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the tactical and support units under its command.[40] A Group of this nature would differ from existing Air Base Groups and from the Groups of the Wing-Base structure because it would include both tactical and support squadrons within it. The Air Base Group commander would supply the single voice of authority and responsibility that was lacking under the February 1952 scheme. Such an arrangement would reestablish the unified control at the bases that had theoretically been provided in the Wing-Base plan, but on a smaller scale. It was proposed, in a sense, to establish a "Group-Base" plan at each fighter-interceptor base.

The superimposition of Air Base Groups over the fighter-interceptor and support units at each base would result in a reduction in the span of control of the next higher echelon of command. If an Air Base Group were placed over the fighter-interceptor and Air Base Squadrons in the 31st Air Division, for example, the number of units reporting directly to Division headquarters would be reduced from twenty-four to eighteen. This would still have required a larger span of control than was customarily regarded as workable. The question was whether another intermediate echelon ought to be introduced between the Air Base Group and the Air Division. This intermediate echelon might be a Wing with a skeleton headquarters whose function would be to provide the direction and supervision that were beyond the Division's power

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40. ADC to WADF, "Air Defense Command Organization," 16 Aug 1952, (Doc 91); ADC to USAF, "Proposed Air Base Group TO's," 28 Aug 1952, as in fn 36.

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to perform. The significant thing about these intermediate Wings, as they were discussed in Air Defense Command Headquarters in the summer of 1952, was that they would be subordinate to the Air Divisions and not on equal echelon with them as were the old Fighter-Interceptor Wings and the Defense Wings created in the February 1952 reorganization.[41]

IV

In the last months of 1952, a new air defense organization was drafted in Air Defense Command Headquarters to go into effect early in 1953. The organization of the future would concentrate control over the weapons of air defense in each sector in the Air Division commander. It would consolidate authority at fighter-interceptor bases in the hands of one commander, and it might include a Wing between the bases and the Air Division so as to limit the Air Division's span of direct control. The new organization would be adaptable for use when an automatic data processing system made it possible to centralize actual operational control in the Air Divisions. And, finally, the new organization would be austere and would make the most economical use possible of a limited and probably contracting pool of authorized manpower.

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41. ADC to WADF, "Air Defense Command Organization," 16 Aug 1952, as in fn 40; see also ADC Briefings for Generals Vandenberg and Browne, 11-12 Aug 1952, in HRF.

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CHAPTER FIVE

OPERATIONAL FACTORS INFLUENCING ORGANIZATIONAL PLANNING

I

In theory the Air Divisions were the operating echelon of the air defense system. They had been established to wield in unison the two independent weapons of air defense, radar and fighter-interceptors.[1] Actually, before and during 1952, the Air Divisions were only capable of limited participation in air defense operations. For lack of a rapid and efficient data transmission and display system, the Air Division commanders were unable to keep abreast of the air situation in the sectors under their jurisdiction.

The Air Division commander exercised operational authority through the medium of the Air Defense Control Center, which was an adjunct of Air Division headquarters. The geographical area embraced by each Air Division, and by each Air Defense Control Center, was known as the "sector." During 1952, there were eleven Air Divisions and eleven sectors in the nation, three in the Eastern Air Defense Force region, three in the Central Air Defense Force region, and five in the Western Air Defense Force region.

The Air Defense Control Center, having no radar of its own,

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1. See, for example, ADC to EADF, "Air Defense Systems Plan," 11 Jun 1952, (Doc 92), for a statement of the original conception of the role of the Air Divisions.

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was completely dependent on the radar stations within its sector for knowledge of the air situation. Located at certain of these radar stations were Air Defense Direction Centers, each responsible for controlling operations within a "subsector."[2] The Air Defense Direction Center had scramble lines leading to a fighter-interceptor base and the communication facilities necessary to control fighter-interceptors after they were airborne. The chain of operational command above the Air Division ran from Air Defense Control Center to Air Defense Force combat operations center to the combat operations center at Headquarters, Air Defense Command. Below the Air Division, the chain of command ran from Air Defense Control Center to Direction Center to fighter-interceptor squadron.[3]

At the Direction Centers, radar operators scanned the surfaces of their plan position indicator scopes for the tell tale blips that signified the presence of aircraft in the sky. When a blip appeared, the scope operator noted its position in reference to the radar site, the course and speed of the aircraft, and the number of aircraft that the blip represented, and "told" that information to another airman who "plotted" it on a vertical or horizontal plotting board. A third airman watched the plotting board, observed the tracks placed upon it,

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2. Other radar stations were designated "early warning" or "surveillance" stations. They had no regular control function and reported their tracks to Direction Centers.

3. See ADC Manual 50-3, "Organization and Functions for Air Defense," 15 Sep 1951 (Doc 139 in ADCHR #2) for a description of Air Defense Command operational organization.

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and told them over a telephone line to the Air Defense Control Center associated with Air Division headquarters. An airman at the Control Center plotted the track information on a display board for the use of Control Center officers.[4] Thus, before the Air Division commander could be informed of the presence of aircraft within his sector, the information had to pass from radar scope operators to plotters for manual plotting on the Direction Center plotting board, and then from the Direction Center teller to the Control Center plotter for manual plotting on the Control Center plotting board.

An interval of time was ordinarily consumed in this process that was incompatible in an age in which aircraft streaked through the sky at near supersonic speeds. A delay of four minutes, for example, when an aircraft was flying at the relatively slow speed of 300 knots, meant that by the time the Control Center received the information, the aircraft would be twenty miles from its reported position. The Air Defense Control Center's picture of the air situation was always several minutes and many miles behind actual events in the sky. Furthermore, because the information was advanced from airman to airman in a human chain, it was possible for human errors to be introduced before the Control Center received the information. In other words, the delayed report received by the Control Center might also be inaccurate.[5] In

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4. For procedures used in this process see ADCR 55-29, "Air Surveillance Procedures," 24 Mar 1952 (in HRF). This regulation was superseded by a new ADCR 55-29 published on 21 Jan 1953.

5. See ADC to WADF, "Fighter Status Reporting Delays," 25 Jan 1952, and 1st Ind, WADF to ADC, 25 Feb 1952, (Doc 93), for comment on delays in the forwarding of fighter status information to the Air Divisions and the Air Defense Forces.

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the event of a saturation raid, it was probable that the manual telling and plotting procedure would prove inadequate to transmit the large number of aircraft position and tactical action reports required to describe what was transpiring. In that case, the Air Division might lose all current contact with the air situation.

Without a current picture of the air situation available in the Control Center, it was impossible for the Air Division commander and his staff to exercise any kind of minute to minute control over the detection, identification, and interception of aircraft. The rapidity of decision and action essential to successful air defense operation was impossible to achieve at the Division headquarters when only stale information was available. The Direction Center, for example, could not wait for permission from the Air Division to scramble fighter-interceptors -- to do so would be to sacrifice the valuable seconds, as a staff study prepared at Air Defense Command Headquarters stated, that could make the "difference between the interception of a bomber raid and a city in ruins."[6]

The Direction Centers, on the other hand, did not suffer from the delays and inaccuracies in the receipt of information that plagued the Control Centers. At the Direction Centers there was actual radar information available on the air situation as it developed. At the Direction Center, not only could the air situation be plotted much

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6. ADC Staff Study, "Discussion Regarding Proposal to Centralize Control of the Air Defense System at Air Division," Incl 1 to ADC, R&R, O&T to OA, "Centralized Control of Air Defense Weapons," 4 Jan 1952, (Doc 94).

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more rapidly than at the Control Center, because the time consumed in telling from the Direction Center and plotting at the Control Center was eliminated, but in controlling fighter-interceptors in the air, a director or controlling officer could himself observe the radar scope and note things as they were occurring without any delay at all. This current view of the air picture was a prerequisite to successful ground controlled interceptions.

II

Because of the lack of a rapid and accurate means of transmitting and displaying aircraft track information, the Air Defense Control Centers could not exert effective control over air operations, and the centralized control in the Air Division that had originally been contemplated was impossible. Perforce, responsibility for the control of actual operations was decentralized to the Direction Centers. It was the Direction Center that controlled the functions of identification, scramble of fighter-interceptors, and interception, and it was the Direction Center that controlled the use of anti-aircraft artillery. When an actual attack came, it would be in the Direction Centers that the air battle would either be won or lost.[7] "Our current concept of operations in air defense is that the Direction Center initiates and controls the action," Brigadier General Clinton D. Vincent, Commanding General of the 25th Air Division, said in March 1952. "It is here that

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7. For a brief discussion of the need to decentralize control over air defense operations to the Direction Centers see ADC Briefing, April 1953, p. 44, in ADC, AG Classified Files.

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we concentrate the equipment and communications necessary to do the complete job.... the Direction Center controller is the key-stone of the entire system -- if he fails, our entire expensive machinery has failed in its purpose."[8]

There were grave dangers inherent in such decentralization. The Direction Center might be able to cope effectively with lone or sporadic raids, but in the decentralized system no one headquarters possessed information adequate to gauge the threat and direct the defenses in a swirling air battle over the area of several subsectors. Seeing only a segment of the total air situation, it was possible for the Direction Centers to scramble fighter-interceptors against diversionary or secondary raids while the main raid escaped without being attacked by an adequate defending force.[9] To divine the intent of

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8. Presentation made at ADC Commanders Conference, March 1952 (in HRF). The well developed air defense system of Great Britain was characterized by a similar decentralization of responsibility for much the same reasons. The British were still using the manual data processing system developed to a high degree of efficiency in World War II. All radar information appeared on the Fighter Command main control table. The C-in-C Fighter Command controlled the overall battle and ordered reinforcements when he considered it necessary, but the actual air battle was to be fought at the sector commanders' level. [Answers to Questions Posed by ADC Representative to the Sixth Fighter Tactical Convention at the Central Fighter Establishment of the RAF, 14 Nov 1952, Incl 1 to ADC to USAF, "Central Fighter Establishment, RAF, Convention," 18 Nov 1952, in HRF 17.] It is important to note that the British problem was simpler because of the smaller geographical area to be defended. In Great Britain, the "sector" was an area which could be placed under the actual operational control of one commander while in the United States the "sector" was too large for that purpose and the "subsector" was the geographical area of actual control.

9. ADC Staff Study, "Discussion Regarding Proposal to Centralize Control of the Air Defense System at Air Division," as in fn 6.

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a massive attacking force and to make the most efficient use of available defense resources, the air battle ought to be interpreted and controlled by a headquarters whose view compassed a large area.[10]

As a result of decentralization it was the responsibility of the Direction Center staff to determine when an aircraft appearing in the subsector was not merely a harmless unknown whose pilot had forgotten to file a flight plan, but an atom bomb carrying hostile intruder. This meant that the relatively junior officers at the Direction Centers bore the awful responsibility of deciding when to set the entire air defense system in motion.[11] As far back as November 1951, this situation had been criticized by General Vincent:

> For the majority of the time and certainly during those critical periods when a reasonably intelligent potential enemy could be expected to attack us, we have on duty, of necessity, young and experienced personnel on whom rests the responsibility for making decisions which are vital to the security of this country. ... It seems to me to be the height of false economy to build a multi-million dollar air defense establishment and only authorize "two bits" worth of rank and experience to use it.[12]

III

For a number of years an effort had been made to give the

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10. See discussion in Project Charles, Problems of Air Defense, I. 42-3.

11. See 2nd Ind, ADC to USAF, 3 Jun 1952, (Doc 95), to ADC to USAF, "Personnel and Equipment Modification List 1-212SP-1," 28 Apr 1952, in which the disparty between the responsibilities and the rank of the commanding officer of AC&W squadrons is discussed.

12. Gen Vincent to CG, WADF, 2 Nov 1951, HRF 232.

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Control Centers the capability to assume control of the air battle.[13] If a rapid and accurate system of transmitting aircraft track information from Direction Center to Control Center could be found, the reasons for decentralization would be removed and the Air Division commander could exercise actual control over operations. Some of the best scientific brains of the nation were working on electronic computers capable of processing aircraft track data and solving intricate space time problems quickly enough to cope with supersonic aircraft and missiles. The air defense system of the future would undoubtedly be equipped with electronic computers of this nature, but they would not be in a form suitable for operational use in the Air Defense Command for a number of years, possible not until 1960.[14] At the same time, work was underway on a number of intermediate devices that might improve data processing until the electronic computers could be built.

One group of intermediate devices was directed at improving the efficiency of handling track information within the Direction Centers. Perhaps the most promising of these was the Target Position Indicator, an ingenious arrangement of cameras, projectors, and filters, combined with a rapid photographic process that transferred raw radar

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13. See, for example, ConAC to USAF, "Improvement of Means for Handling AC&W Information," 22 Jul 1950, (Doc 96).

14. One of these devices was the Whirlwind developed at the Massachusetts Institute of Technology. Project Rand, Air Defense Study, p. 273; Project Charles, Problems of Air Defense, I, pp. 118-122; II, Appendix IV-6; Gen Chidlaw to Gen Vandenberg, 13 Oct 1952, (Doc 97).

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information from a plan position indicator scope to a clean display on a vertical air situation board where it could be observed by Direction Center officers. The Target Position Indicator eliminated the delays and inaccuracies entailed in the manual handling of track information within the Direction Center, but it offered no aid in the transmission of the air situation picture from the Direction Center to the Control Center. Transmission would still have to be accomplished by manual tellers and plotters.[15]

In 1950 and 1951, American air and naval officers witnessed demonstrations in Great Britain of an electronic data processing system developed for the Royal Navy.[16] This device, known as the Comprehensive Display System, could be used to process data within a radar station with a systematization and efficiency far greater than was possible even

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15. The Target Position Indicator was often referred to as a "quick fix" device because it was believed that it could be procured for operational use with little delay. There were two Target Position Indicators under development - the Land TPI and the Kenyon TPI. The Kenyon TPI was developed under the aegis of the Rome Air Development Center and the Land TPI under the aegis of Project Lincoln. USAF to Air Proving Ground Command, "Comparative Operational Suitability Test of Photographic Projection System," 18 Apr 1952, (Doc 98). The principal difference between the two systems was in the rapid photographic processes used to develop the photographic images. See"A Description of the Target Position Indicator," ADC, C&E Digest, December 1951, pp. 7-9, and Project Charles, Problems of Air Defense, I, 44-48; II, Appendix III-2. For a detailed description of the Kenyon TPI see "The Kenyon Rapromatic Type SS TPPI," ADC, C&E Digest, August 1952, pp. 10-15, September 1952, pp. 5-16.

16. Director, Naval Research Lab to Chief, Bureau of Ships, "Comprehensive Display System; Operational Evaluation of," 21 Aug 1951, in ADC, P&R files.

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with the educated lenses and rapid photographic processes of the Target Position Indicator. It had the capacity to handle one hundred aircraft tracks simultaneously, roughly ten times the capacity of the existing manual methods. The X-2 model of the Comprehensive Display System, which the British demonstrated in the summer of 1951 and which was subsequently brought to the United States for tests at the Chesapeake Bay Annex installation of the Navy's Operational Development Force,[17] was not able to transmit data from one location to another - like the Target Position Indicator, that model of the Comprehensive Display System was only a display device. But the heart of the Comprehensive Display System was an electronic "store" into which information about aircraft tracks could be inserted as direct current potentials and retained until summoned for presentation in electronic displays as needed by operational officers.[18] "As one man explained it to me," General Bergquist said,"if you have a bucket full of blips and you throw it in this one place, then somebody sorts out those blips, puts them in slots, and [you] put a nickel in for whatever kind of blip you want."[19] The fact that this information was stored and displayed

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17. Director, Naval Research Lab to Chief, Bureau of Ships, "Comprehensive Display System; Operational Evaluation of," 21 Aug 1951, as in fn 16; "The USAF Test Program of the Comprehensive Display System," n.d. [January 1952], HRF 406.

18. For a description of the Comprehensive Display System see Laboratory for Electronics, Final Engineering Report on Comprehensive Display System, December 1951, in ADC, P&R files.

19. Statement in ADC Briefing for General Hoyt S. Vandenberg, 11 Aug 1952, p. 42, in HRF B106.

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electronically opened up the possibility that there might be a way to transmit it as electronic impulses over a land line for display at another location. In other words, it might be possible to use the electronic Comprehensive Display equipment to create a data processing net in which information was compiled and displayed at individual radar stations and transmitted for simultaneous display at the Control Center. In the phrase used by officers at Air Defense Command Headquarters, the Comprehensive Display System was potentially "nettable," the other intermediate devices under development were not.

If aircraft track information could be compiled and displayed electronically at the Direction Centers and Control Centers simultaneously, the delays inherent in the manual system would be eliminated. If the Control Centers were informed of events in the air at the same time as the Direction Centers were, effective operational control could be centralized in the Air Division commanders' hands. The fact that the data would be handled and transmitted electronically would eliminate the human errors that were bound to exist in any manual process.

Spurred by these attractive prospects, the Air Force in 1951 signed a contract with a private electronic engineering firm, the Laboratory for Electronics of Boston, Massachusetts, to study the British Comprehensive Display System and to develop a plan for producing the device using American radar andAmerican parts.[20]

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20. USAF to Air Proving Ground Command, "Operational Evaluation of the Comprehensive Display System," 11 Sep 1951, Incl 1 to USAF to ADC, "Evaluation of the Comprehensive Display System," 11 Sep 1951, with 1st Ind, ADC to USAF, 27 Sep 1951, (Doc 99).

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The Laboratory for Electronics developed an Americanized version of the British system, known by the designation ACDS as distinguished from the British CDS.[21] By the Spring of 1952, it was decided in the Pentagon that of all the intermediate devices under consideration, the ACDS was the only one that promised a significant enough improvement in data processing efficiency and track handling capacity to warrant procurement. The USAF staff proposed that the ACDS be used in areas of high air traffic while the Target Position Indicator be used in areas of lesser air traffic where the problem of display and transmission delay was not as critical. The Air Defense Command was asked to develop a concept of operations for the use of the ACDS, that is, an organization in which the ACDS could be effectively used.[22]

IV

The plan drawn in Air Defense Command Headquarters was based on the assumption that the ACDS would be ready for operational use by 1955 and a way would be found by then to transmit track information electronically from the Direction Centers to the Control Centers. In the Air Defense Command plan, the nation was divided into "electronic areas," in which the ACDS equipment was to be used, and "non-electronic areas" in which manual methods of transmission were to be

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21. See Laboratory for Electronics, Final Engineering Report on Comprehensive Display System, December 1951, as in fn 18.

22. USAF to ADC, "Employment of an Americanized Version of the Comprehensive Display System (ACDS)," 12 Jun 1952, (Doc 100).

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retained. The electronic areas were areas of heavy air traffic. They were within the double perimeters of radar stations and fighter-interceptor bases that were to exist when the fifty-seven squadron fighter-interceptor program and mobile radar program were realized. Thus, the great eastern perimeter area (including twenty-four states, extending to the southern borders of North Carolina and Tennessee and to the western borders of Missouri, Iowa, and Minnesota) was an electronic area to be equipped with the ACDS. On the West Coast, the double perimeter defense areas protecting Los Angeles and San Francisco, and the Northwest (including the states of California, Oregon, and Washington, most of Nevada, and parts of Arizona and Idaho) were to be equipped with the electronic equipment. The remainder of the nation, outside of the double perimeters (including twenty states in the south and midwest), where air traffic was lighter and there were fewer important targets, was the non-electronic area in which the manual data processing system was to be retained.[23]

In the electronic areas, each radar station was to be equipped with ACDS equipment. An electronic transmission system, not yet developed, would make it possible to centralize control over operations at these stations in the Air Defense Control Centers, that is, in the hands of the Air Division commanders. With an ACDS net, effective control could be exercised by one commander over a much larger area than the subsectors covered by the existing Direction Centers, but

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23. The twenty states in the non-electronic area included Arizona and Idaho, parts of which were in the Western electronic area.

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not so large as the sectors covered by the existing Air Divisions. The volume of air traffic that would be transmitted by electronic means from the radar stations would be too great for the existing Air Divisions to handle. Accordingly, in the Air Defense Command 1955 operational plan, the electronic areas were divided into smaller sectors, each containing an average of eight radar stations. The sector boundaries were determined after study of the number and character of probable enemy targets in each area and the forces available to defend them. ACDS equipment to be installed in the Control Center at Division headquarters had the capacity to handle one hundred simultaneous tracks. Thus, it was necessary to fix the size of each Air Division sector so that no more than one hundred hostile tracks would probably penetrate it at the same time. To reduce the size of the sectors to this probable one hundred track penetration level, seven new Air Divisions would have to be created, increasing the number of Air Divisions in the electronic areas from seven to fourteen.

In the non-electronic areas, the radar stations were to be equipped with Target Position Indicators to increase their internal efficiency. Tracks would continue to be reported to the Control Centers by voice transmission for manual plotting. No new Air Divisions were required in the non-electronic areas. Thus, in the planned system of 1955 incorporating the ACDS, the number of Air Divisions would be increased from eleven to eighteen. One hundred and four ACDS units would be required, twenty-one at radar sites in Canada that were

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to be tied into the American system.[24]

Because it was desirable to have the area of each double perimeter completely within one Air Defense Force region, the 1955 plan included a provision to alter the boundaries of the Defense Forces. The Eastern Air Defense Force region, for example, was to be extended to the west and south in order to bring all the area covered by the eastern double perimeter within it. Similar adjustments were to be made in the Western Air Defense Force regional area.[25]

The important organizational feature of this planned system incorporating the ACDS was that the Air Defense Control Center, or Combat Center as it came to be called, at Air Division headquarters would be capable of exercising centralized control. The Combat Center was, the Air Defense Command staff explained to USAF officers, "the heart of this system."[26] At the Combat Center, evaluation of the enemy threat and assignment of defense weapons for the air battle was to occur, although the details of the battle itself would continue to

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24. ADC to USAF, "Plan for Employment of the Americanized Version of the Comprehensive Display System," 21 Jul 1952, with 1st Ind, (Doc 101); See ADC to RCAF, ADC, "Meeting to Discuss Plan for the Employment of the Americanized Version of the Comprehensive Display System (ACDS)," 22 Aug 1952, (Doc 102) for a statement of the importance of integrating radars on both sides of the Canadian border into the proposed electronic system.

25. ADC to USAF, TWX, 8 Oct 1952, (Doc 103); ADC to USAF, "Air Defense Boundaries," 5 Nov 1952, (Doc 104).

26. Col E. A. Harbes, ADC P&R, at Briefing for Gen Vandenberg, p. 33.

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be fought at the individual Direction Centers. In short, the Air Division in the new system was to occupy the central operational position that had originally been contemplated for it.

The Air Defense Command operational plan for the ACDS was approved by Headquarters, USAF, on 22 August 1952 with certain reservations.[27] The Pentagon staff thought that it might be possible to use a less expensive, less complicated component than the ACDS at early warning stations to feed data into the electronic net. If that were so, it would reduce the required number of complete ACDS sets below the figure of 104 estimated by the Air Defense Command staff. There was some doubt in Washington that the electronic system could be achieved by 1955, particularly as the difficult technical problem of tying the individual ACDS sets into an integrated electronic net had not yet been solved. USAF asked the Willow Run Research Center of the University of Michigan to develop equipment that could integrate and display the electronic air surveillance information from a number of ACDS stations into a centralized Control Center.[28]

In September 1952, the Willow Run Research Center presented a plan for an integrated air defense system using the ACDS as its

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27. Certain details of the plan were approved separately at a later date. See for example, USAF to ADC, "Approval of Seven Air Divisions and Thirty-five Mobile Stations," 30 Oct 1952, (Doc 105).

28. The Bell Telephone Laboratories were also working on an electronic data link. 1st Ind, USAF to ADC, 22 Aug 1952, to ADC to USAF, "Plan for Employment of the Americanized Version of the Comprehensive Display System," 21 Jul 1952, (Doc 100).

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basic component.[29] The following month, the Michigan proposal was accepted by the officers at Air Defense Command Headquarters as meeting the requirements for the 1955 air defense system.[30] The new system incorporating the Michigan Plan was renamed the Air Defense Integrated System (ADIS).[31] It was improbable that the complete Air Defense Integrated System could be realized by 1955, but parts of the system might be operational by that date.[32]

As 1952 ended, plans were being prepared to test the Air Defense Integrated System in the 30th Air Division sector.[33] The increase in the number of Air Divisions and corresponding decrease in the size of the Air Division sectors, and the realignment of Air Defense Force regions, would not actually be necessary until the Air Defense Integrated System was available and the phase-in of the mobile radar

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29. This proposal, called "The Michigan Air Defense System," was made in WRRC document UM4-100, a copy of which is in ADC P&R files.

30. Gen Chidlaw to Gen Vandenberg, 13 Oct 1952, as in fn 14.

31. P&R Project Report, Development of CDS, American Version, initiated 19 Feb 1951, HRF 406.

32. "It is now fairly evident that no presently postulated complete air defense environmental system can be realized by 1955," General Twining wrote General Chidlaw in November. "It appears at this point that the essence of the Michigan System, UM4 100, could approximate fulfillment of your requirements, and that it could be implemented operationally by 1955, but it can do so only if it is developed in an evolutionary manner wherein certain of its functional components are fulfilled initially with hardware which can now or in the near future be acquired 'off the shelf'". [Twining to Chidlaw, 13 Nov 1952, (Doc 106)].

33. ADC to EADF, "Air Defense Integrated System for Surveillance and Weapon Control (ADIS) Test Sector," 1 Dec 1952, (Doc 107).

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stations made the double perimeters an actuality rather than a theory. In the meantime, however, certain features might be made a part of the new organization planned for 1953 in order to facilitate the change from the existing system to the 1955 system.

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PART III

PLANS AND PROGRAMS

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area.[4] The necessity of including some sites within the double perimeter defenses had an important bearing on the work of the teams sent out to locate specific sites upon which the stations were to be constructed.

Also important to the nature of the siting effort was the restriction imposed on ADC as to funds to be expended for real estate and construction. One of the important observations which Headquarters USAF noted and continuously reiterated was the fact that the Mobile Program was, in essence, an "austerity" program, and that funds for its implementation were limited.[5] Although the Air Defense Command was quick to point out to USAF that the fund restrictions would entail a compromise with ideal operational requirements, such a compromise was unavoidable.[6] The situation was painful because of the fact that once before in ADC's experience the command had been obliged to compromise on a similar enterprise, with regrettable consequences. The Permanent network had also been, in many respects, a compromise program, financially, and in some instances considerations of economy had necessitated selection of sites which were not in conformity with the criteria of ideal siting.[7] When the first phase Mobile

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4. See map, which follows.
5. ADCHR #3, pp. 38-9.
6. ADCHR #3, p. 39.
7. ADCHR #1, p. 96-100.

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CHAPTER SIX

THE MOBILE PROGRAM

I

Insofar as the Mobile Radar Program was concerned, the last six months of 1952 were characterized by continuing uncertainty. This uncertainty, which had a detrimental effect on ADC planning, was caused by difficulties in determining the kind and quantity of radar equipment that was to be used in the radar sites, as well as in determining the specific roles the Mobile stations were to play in the air defense system as a whole. In addition to these important problems, the complexity of programming the communications and manpower requirements for an ambitious program such as this, which involved the addition of 79 more ground radar stations to the AC&W network, caused difficulties which could not be overcome in very short order, but which required meticulous coordination among all the agencies involved in the creation of the system. These agencies, besides ADC, were Headquarters USAF, the Corps of Engineers of the Army, the Air Materiel Command, the manufacturers and sub-manufacturers of the electronic equipment, and the builders who were to erect the stations. Although the target date for the implementation of the first phase of the Mobile Radar Program was set by Headquarters USAF at 1 July 1952, ADC had long ceased to be optimistic about achieving that goal. By the

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end of 1952, estimates for the completion of the program had been revised to consider 1954 as a more reasonable target date for this part of the program.[1]

In the preceding History of the Air Defense Command, it was revealed that the first phase of the Mobile Program was revised in January 1952, in accordance with a new concept of deployment of air defense weapons known as the "double perimeter."[2] The 44 Mobile radar sites which were to constitute the first phase of the total program were divided into two categories depending on their relation to the double perimeters: those that were to be part of that system, and those that were to provide for the defense of isolated target areas such as AEC installations and SAC bases not included within the double perimeter defenses.[3] Generally speaking, approximately half of the 44 sites in the first phase of the Mobile Program were to be included within the double perimeter defenses of the three vital areas of the Northeast, the Northwest and the California

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1. R&R, 8 Oct 1951, in AGC 676.3. The Mobile Program developed in two phases -- the first phase to contain 44 sites, and the second phase to consist of 35 more.

2. ADCHR #3, pp. 31-43.

3. ADCHR #3, pp. 38-39; 3d Ind, 29 Apr 1952, to ADC to USAF, "Mobile Radar Program," 18 Jan 1952 (Doc 19 in ADCHR #3); also Memo, "Set of Ground Rules of Selecting Sites for Revised Mobile Radar Program," by Major M. F. Crispen, (Doc 108).

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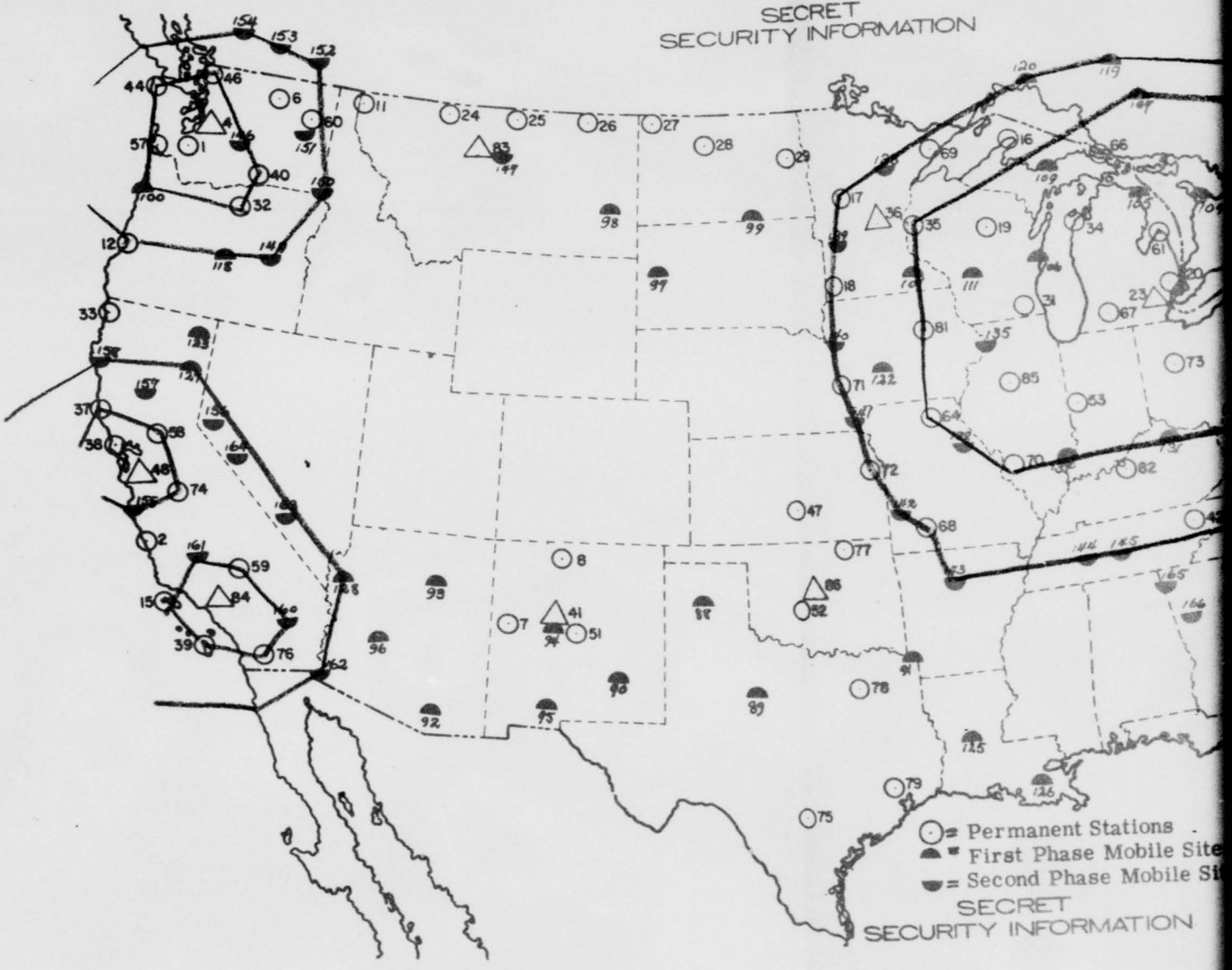

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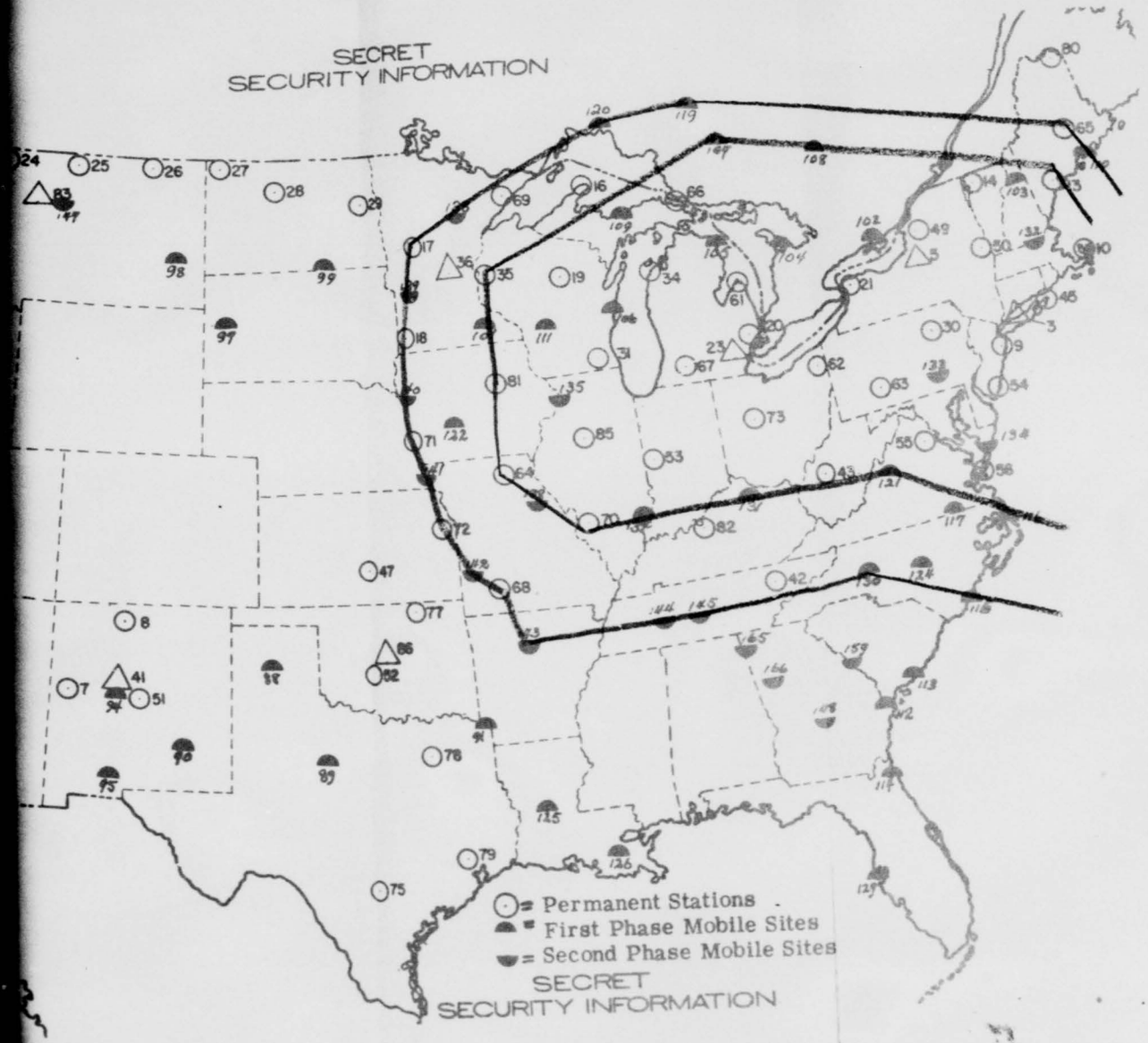

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in programming for the Mobile stations. In October 1952, a thorough and systematic study of the functions of all the stations in the projected ADC radar network was begun. The study had not been completed by the end of 1952, although the pattern of the ultimate AC&W functions had emerged sufficiently to acquaint ADC with a number of important truths which were to affect the implementation of the Mobile Program, particularly in the allocation of radar equipment. In the meantime, until final determination of functions had been made and approved by higher authority, the best that could be done was to indicate approximately the functions of the stations so that the procurement and production of the radar equipment could progress unimpeded.[11]

In addition to the nineteen sites changed in February 1952, an additional number of relocations resulted from continued siting experience. On 11 September 1952, ADC indicated to USAF that further study of the concept of the double perimeter and the development of the multiple corridor identification system dictated the relocation of three of the Mobile sites as follows: M-130, whose old location was at Patrick AFB, Florida, was to be resited at Elkin, North Carolina; Site M-101, previously at Massena, New York, was to be placed at Rochester, Minnesota; and Site M-131, formerly scheduled for Clinton AFB, Ohio, was to be resited at Salt Lick, Kentucky.[12]

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11. Eighteen of the 44 sites of the first phase were to remain under their original designation as early warning stations, and the remaining 26 stations were to perform both early warning and ground control intercept functions.

12. ADC to USAF, "Mobile Radar Program (1st Phase)," 11 Sep 1952, (Doc 110); ADC to WADF, "New Locations for Eight AC&W Installations," 18 Dec 1952, (Doc 111).

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On 9 December 1952, three sites in the WADF region were also resited: M-118 was resited at Hampton, Oregon; M-123 at Fort Bidwell, California; and M-100 at Mt. Hebo, Oregon.[13]

II

As was mentioned above, the sites of the first phase of the Mobile Program were divided into two categories: those that were part of the double perimeter system, and those that were not. In general, for those that were not part of the double perimeter system, the same siting criteria were used as for the sites in the Permanent System.[14] The aim of these stations was to extend the high altitude coverage of the Permanent System into target areas which were not provided coverage by the "P" stations. As to those sites that formed part of the double perimeter, however, only a small amount of latitude could be used by the siting teams. Generally, these sites had to be within fifteen or twenty miles of the coordinates established by the Air Defense Command. It was the aim of this part of the siting program to get good coverage down to 4-5000 feet in the double perimeter area. It was recommended that the siting teams select the best site available for operational purposes and also one or two alternate sites which offered the best opportunity for construction and logistical

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13. ADC to WADF,"Siting Surveys for Radar Sites, First Phase Mobile Program," 9 Dec 1952, (Doc 112); Msg, ADC to USAF, 1 Dec 1952, (Doc 113); ADC to USAF, "Mobile Radar Program (First Phase),"20 Sep 1952, (Doc 114).

14. ADC, "Set of Ground Rules in Selecting Sites for Revised Mobile Radar Program," n.d., (Doc 108). See map, "Approximate Coverage of the Permanent and Proposed Mobile Radar Systems," which follows.

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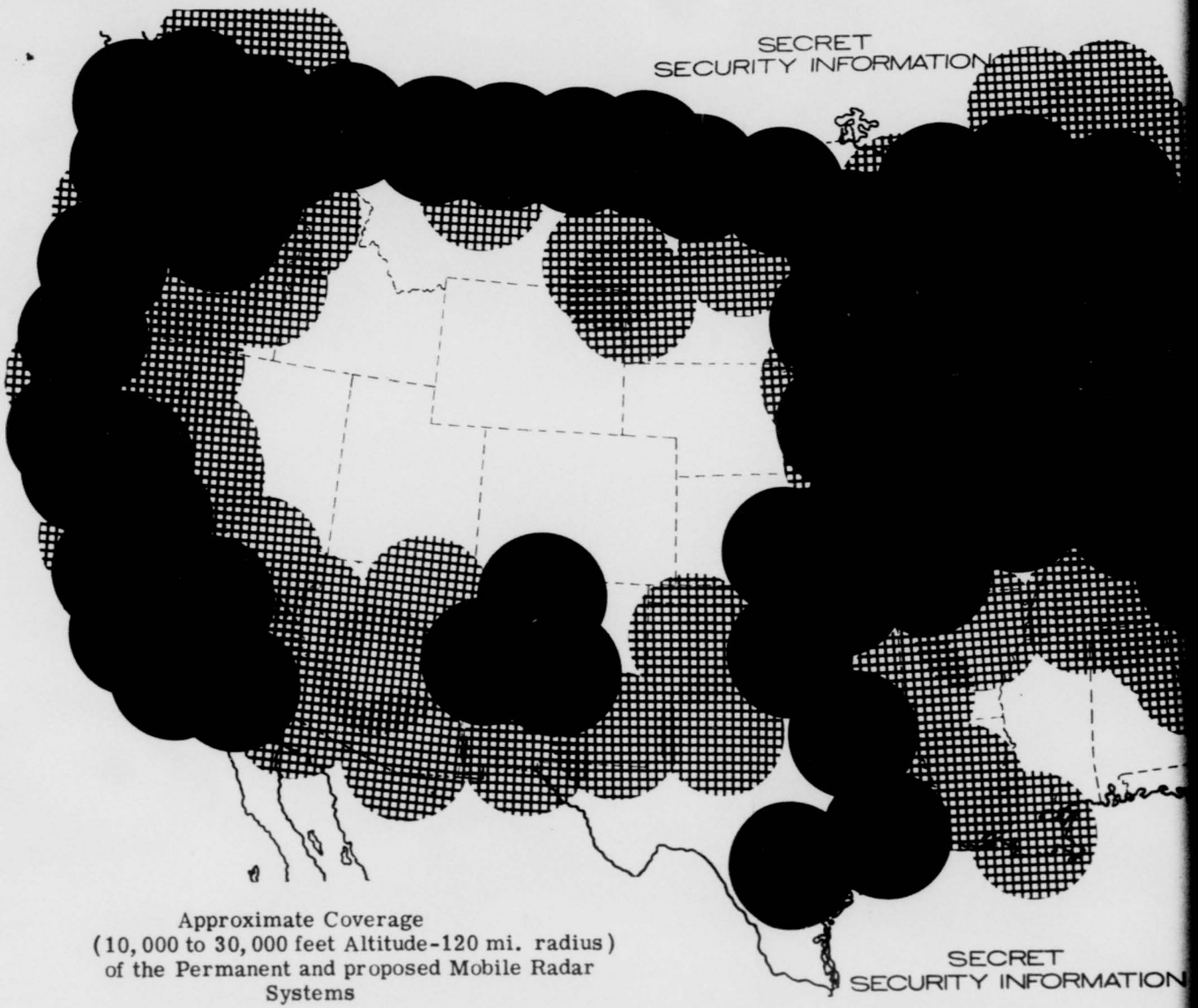

Approximate Coverage
(10,000 to 30,000 feet Altitude-120 mi. radius)
of the Permanent and proposed Mobile Radar
Systems

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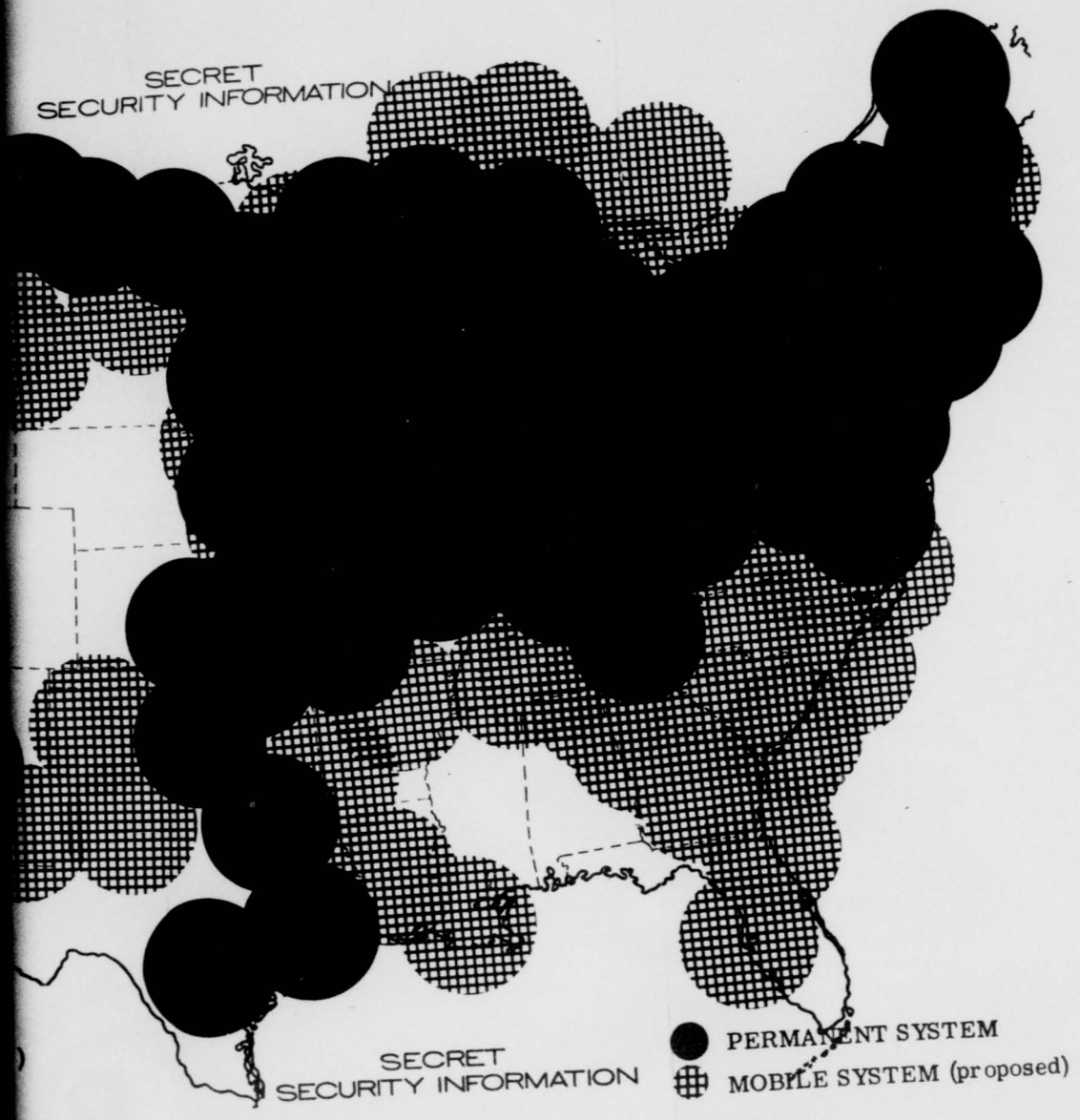

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savings. Also, the stipulation was made that the Mobile radars were to be located on existing government-owned installations where possible. Decisions were then to be made by the Defense Forces and by ADC to reconcile the operational requirements against the practical considerations involved in selecting the final sites.

Though the siting made progress, its course was hindered by confusion in information as to the type of construction and equipment to be placed at the chosen sites. For example, in the early phases of the revised siting effort, misunderstanding arose between Headquarters USAF and ADC as to the types of buildings to be erected to house the transmitters and receivers at the sites. It was ADC's belief that prefabricated buildings would be employed, but it learned to its surprise that the Corps of Engineers was notifying its district headquarters that Jamesway shelters were to be used instead.[15] Pending resolution of this confusion some delay in siting ensued.

Late in June 1952, Lieutenant Colonel William A. Lafrenz of the Directorate of Communications and Electronics, Headquarters ADC, was sent to Headquarters USAF "in an attempt to resolve the numerous conflicting facts on the Mobile radar program which were received in various letters from Headquarters USAF."[16] Additional siting informa-

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15. Msg, ADC to USAF, 21 May 1952, (Doc115); USAF to ADC, "Procurement of Prefabs for Mobile Radar Sites," 23 Sep 1952, (Doc116). See also, Memo to Col H. E. Neal, 18 Jun 1952, (Doc117).

16. R&R, DCE to P&R, "Mobile Radar Program," 3 Jul 1952, (Doc118). Memo, "Results of TDY to Washington," 30 Jun 1952, (Doc119).

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tion gathered on this visit was incorporated in revised criteria issued to the Defense Forces. The Air Defense Forces were especially admonished to select sites which had sufficient land area to provide for installation of backup radars as well as primary equipment.[17] This was significant in view of the fact that in the siting of the "P" system, backup radar had not been sited during the early phases of the program. This necessitated a certain amount of improvisation at a later date.

Another problem in implementing the Mobile Program was caused by the lack of radar towers. Since USAF indicated that towers would not be forthcoming until after the "M" system became operational, ADC was obliged to improvise in its planning.[18] On 24 July, ADC notified USAF that "in the absence of any specific knowledge as to the details of type of communications equipment to be used, and the method of mounting, and the type of fixed housing, therefore, such as van or trailer, and other pertinent elements, ADC has directed the air defense forces, for estimating purposes only, to assure that preliminary site selection and layout and cost estimates, were to be

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17. ADC to WADF, "Site Surveys, Revised Mobile Radar Program," 10 Jul 1952, (Doc 120).

18. R&R, DCE to P&R, "Mobile Radar Program," 3 Jul 1952, (Doc 118).

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based on the assumption that earth mounds were to be used."[19]

III

By the end of the year, siting of nearly all of the proposed stations had been accomplished. Also, the perplexing equipment allocation problem had been solved so far as to the types of radar which were to perform the primary search and height-finding functions for the stations, even though the determination of all of the types of backup equipment had not as yet been firmly made.[20] The latter matter was dependent upon both the outcome of the ADC functions study and budgetary considerations.

The first phase Mobile stations were programmed for primary

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19. ADC to USAF, "ADC Implementation of Mobile Radar Program," 24 Jul 1952, (Doc 121). CADF, commenting on the use of earth mounds, wrote ADC on 15 September 1952 that it did not believe they were the direct answer to the problem of elevation. CADF observed that the cost of building an earth mound sufficient to withstand erosion would be prohibitive, and that in coastal areas, the supply of suitable earth would be unlikely. Finally, CADF stated, "This headquarters is most reluctant to rush headlong into these surveys with insufficient planning data available. Reasonable caution is urged, lest the costly errors such as those which occurred in the Permanent Radar Program are repeated." /CADF to ADC, "Mobile Radar Siting Surveys," 15 Sep 1952, (Doc 122).

20. Although by the end of 1952, the allocation of standby search and height-finding ground radar equipment for the total air defense net was by no means firm, nevertheless, plans were made for the provision of standby radar for the Mobile program. The following types of ground radar were tentatively programmed: Type V stations were to receive for backup, the AN/TPS-1D search radar, and for backup height-finding purposes, the AN/TPS-10D. Types VI and VII were to receive as backup search equipment, the AN/TPS-1D, and as backup height equipment, the AN/MPS-8 (although ADC was not sanguine about the receipt of this last-mentioned equipment for this particular purpose). R&R, DCZ to P&R, "Mobile Radar Program," 3 Jul 1952, (Doc 118).

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search and height finders in accordance with the functions they would perform in the radar net -- early warning or early warning with a GCI capability. The programming of ground radar for the first phase depended on the type of station.[21]

The Mobile radar stations scheduled to perform solely an early warning function were to receive an AN/MPS-11 search radar and an AN/MPS-8 height-finder. The stations scheduled to perform a GCI, as well as an early warning function were to be equipped with AN/MPS-7 search radars and AN/MPS-14 height-finders.[22] It was ADC's ambition in the earlier stages of planning for the revised program to have all of its ground radar for the first phase, of the fixed variety; however, the possibility of some of the radars in the Mobile Program being moved subsequently to different locations, prompted a decision on the part of Headquarters USAF to schedule all of the ground radars for the program of the mobile variety. The case was arguable. Thus, for example, the Mobile stations which were to be part of the double perimeter defenses, should have been in ADC's opinion, fixed installa-

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21. The forty-four radar sites of the program were designated either as Type V, VI, or VII stations. Type V was originally conceived as an Early Warning station, whose function it would be to fill gaps, without necessarily performing a ground control intercept function. This type of station, consequently, possessed equipment which was not as heavy or powerful as the Type VI and VII stations, which were destined to play a combined early warning-GCI role in air defense. The latter two types of stations were fundamentally the same, and possessed the same type of radar. The only appreciable difference was in the number of personnel and facilities provided, and this depended on the amount of activity anticipated at the station.

22. The MPS-7 was a mobile version of the FPS-3, and the MPS-14, a mobile version of the FPS-6 height-finder. The MPS-11 was a mobile version of the FPS-8, and the MPS-8, of the TPS-10D height-finder.

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tions, since it was not anticipated that these stations would be relocated because of the essential strategic defense role they would enjoy.[23] On the other hand, that portion of the first phase of the program which was to provide for the defense of isolated targets, such as SAC bases and AEC installations, might require mobility in the event the SAC forces were redeployed from their stations, or if the AEC installations were reduced in defense priority.

At the end of the year, delivery schedules for the heavier type mobile equipment were uncertain. ADC did not anticipate that the MPS-8, MPS-14, MPS-11 or MPS-7 ground radars would be available until late in 1953, or sometime in 1954. In the case of the TPS-1D search radar and TPS-10D height-finder, the procurement situation was somewhat better. By the end of the year, the Air Materiel Command had notified ADC that a quantity of these radars were available for installation. However, ADC could not take advantage of this offer, in view of the unfinished status of the siting program and the absence of minimum facilities. Consequently, ADC advised AMC to withhold shipment of these radars to the field until a more appropriate time.[24]

In spite of ADC's earlier conviction that it would not be economical to interpose a Lashup phase in the implementation of the Mobile

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23. ADC to USAF, "Mobile Radar Program," 18 Jan 1952 and Ind. (ADCHR #3, Doc No. 19); also ADCHR #3, pp. 40-41.

24. Msg, Rome AF Depot to ADC, 15 Dec 1952, (Doc 123). There was a strong possibility that the TPS-1D and TPS-10Ds, programmed as backup radars, would reach the field before the radars destined as primary equipment.

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radar program, three sites were designated as operational in 1952: M-97 at Rapid City, (CPS-5) M-94 at Kirtland AFB, (CPS-5) and M-90 at Walker AFB, (TPS-1B). The decision to employ Lashup radar gear at these sites was dictated by important defense considerations. Rapid City AFB and Walker AFB were important SAC installations, and Kirtland AFB was the hub of the New Mexico air defense complex. It was planned that these Lashup radars would be replaced by the more modern Mobile equipment.

IV

The first phase of the Mobile Radar Program called for the erection of six Mobile sites in Canadian territory. The siting of these stations outside of the continental United States, in Ontario and Quebec, was due of the necessity of completing the double perimeter surrounding the vital northeastern air defense area. Similarly, in the second phase of the Mobile program, three stations were programmed in the province of British Columbia, to complete the double perimeter defenses around the important Hanford-Seattle air defense area in the northwest. The rationale behind ADC's decisions to site the six stations of the first phase of the program was not quite clear to the Canadian government because of its ignorance of the double perimeter theory of area defense. The Canadian government asked for a detailed justification, and after being briefed by ADC on the double perimeter

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theory, approval was immediately forthcoming.[25] Similarly, the same time, approval was granted by Canada for the location of the three stations of the second phase of the program in the Canadian Southwest.

In October 1952, the second phase was approved in principle by Headquarters USAF, with the unpalatable proviso that ADC man this program from within its own resources pending provision by USAF of the necessary personnel at a later date.[26] The disagreeable task of finding the necessary personnel promised to call forth all of ADC's ingenuity in the forthcoming months.

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25. ADC to RCAF, "Mobile Radar Program, 2d Phase," 5 Dec 1952, (Doc 124); ADC to USAF, "Canadian Approval for Three Mobile Radar Sites," 9 Dec 1952, (Doc 125); ADC to USAF, "Mobile Radar Sites in Canada," 14 Aug 1952, (Doc 126); ADC to USAF, "Mobile Radar Program (2d Phase)," 10 Sep 1952, (Doc 127); Maj M. F. Crispen, Memo, 17 Jan 1953, (Doc 128); USAF to ADC, "Canadian Approval for Three Mobile Radar Sites," 5 Nov 1952, (Doc 129); USAF to ADC, "Mobile Radar Program (Second Phase)," 25 Jul 1952, (Doc 130); ADC, "Justification for Six Mobile Radar Sites in Canada," 22 Oct 1952, (Doc 131); Msg, USAF to ADC, 12 Jul 1952, (Doc 132); Msg, ADC to USAF, 18 Jul 1952, (Doc 133).

26. USAF to ADC, "Mobile Radar Program (Second Phase)," 18 Oct 1952, (Doc 134); R&R, M&O to PPM, "Mobile Radar Program (Second Phase)," 5 Nov 1952, (Doc 135); R&R, P&R to DCS/O, "Mobile Radar Program (Second Phase)," 1 Nov 1952, (Doc 136); Msg, ADC to USAF, 14 Oct 1952, (Doc 137).

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CHAPTER SEVEN

SEAWARD EXTENSION OF AC&W

I

One of the most conspicuous deficiencies in the defense system for the continental United States was the continuing vulnerability of the many important coastal targets in the nation. The phasing-in of the shore-based Permanent radars did little or nothing to rectify this deficiency.[1] Even after the radars on the Atlantic and Pacific seaboards had come into operation, the statement of the Joint Air Defense Board that most of the targets located on or near the coastlines were defenseless, was still true.[2] ADC and USAF were both well aware of this condition, and as early as 1948, this deficiency had been anticipated.[3] The proposed resolution of this critical problem lay in the joint use of two supplementary radar resources: airborne early warning and control aircraft and shipborne radar.

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1. Air Defense Plan for the Continental United States, Part II: Air Defense Requirements, 1952-1955, 10 Nov 1952, Appendix 1, Annex C, p. 2, HRF 114.

2. Joint Air Defense Board Project No. 4, Seaward Extension of AC&W for the Continental United States, April 1952, p. 2, in JADB Files.

3. See ADCHR #1, p. 59.

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II

In the previous history of the Air Defense Command the progress of the AEW&C program has been described down to the middle of 1952.[4] In that discussion there were revealed a number of difficult matters which occupied much of the time and effort of the Air Defense Command during the first six months of 1952. The resolution of these problems continued to occupy ADC during the latter half of 1952.

As has been described in the preceding history of the command, one of the most troublesome obstacles affecting the speedy realization of the AEW&C program was the question of the number and location of the air bases which would house the AEW&C aircraft. In April 1951, when ADC had first posed its requirement for an AEW&C capability, it was believed that five air bases -- three on the East Coast, and two on the West Coast -- would be necessary.[5] Early in 1952, ADC, in drawing up its first elaborate operational plan for the utilization of AEW&C aircraft,[6] advocated a revision of the five-base program. Instead of the previous deployment, ADC recommended that two air-bases, one on the East Coast at Mitchel AFB, and one on the West Coast at Hamilton AFB, be employed. Although ADC continued to advocate the two-base concept, the specific location of these bases was a

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4. See ADCHR #1, p. 59.

5. Whitehead to C/S USAF, "Requirement for AEW&C Aircraft," 9 Apr 1951, (ADCHR #2, Doc 195).

6. ADC Operational Plan for AEW&C, 7 Feb 1952, (ADCHR #2, Doc 24).

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moot point in the protracted negotiations with USAF on this subject. On 3 June 1952, ADC indicated a change of heart about the value of Hamilton and Mitchel, noting the extensive runway expansion which would be required at these locations in order to operate the RC-121C and D aircraft.[7] In place of Hamilton and Mitchel, Otis and/or Suffolk AFBs on the East Coast, and Mather or Castle AFBs on the West Coast, were recommended.

Though ADC was extremely anxious to obtain approval of its two-base deployment plan, USAF was loathe to decide the issue precipitously in view of the fact that the operational plan itself, as well as such important matters as personnel and funds, was still being considered. Nevertheless USAF had certain reflections on the question of location of ultimate bases which were communicated to ADC. Thus, USAF objected to the use of Mather AFB on the grounds that it was receiving extensive use by the Air Training Command, and suggested that ADC's original plan to use Hamilton was more to its liking in view of the fact that the latter base was not, in USAF's opinion, being used to the full extent of its facilities.[8] USAF's recommendation of Hamilton had little merit in ADC's eyes, suffice it to say, and the use of Hamilton was rejected. On 14 July 1952, ADC was asked to submit an elaborate comparative analysis of costs in justification

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7. ADC to USAF, "Selection of AEW&C Bases," 3 Jun 1952, and Inds., (Doc138).

8. Ibid., 1st Ind, USAF to ADC, 14 Jul 1952.

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for its two-base idea, a chore which threatened to delay a decision on ADC's operational concept until it was completed and analyzed at length at higher headquarters.[9] Nevertheless, the task was undertaken, and ADC revealed the value of its proposal in terms of dollars and cents saved, as well as in important economies in manpower.[10]

By mid-July 1952, ADC had made up its mind on the location of the East Coast site. Otis AFB in Massachusetts was its firm choice.[11] By the end of August, McClellan AFB, near Sacramento, California was the West Coast choice.[12]

At long last, on the 16th of September 1952, USAF notified ADC that the two-base concept had been approved and that McClellan and Otis had been selected as the parent bases for the AEW&C program.[13] A troublesome issue had been thus decided, but the decision merely marked the beginning of the next step in the story, namely, the readying of the facilities at each of the two bases in order to support the giant aircraft when they came off the production lines.

III

The necessity for a speedy preparation of the required bases

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9. Ibid.

10. Ibid., 2d Ind, ADC to USAF, 22 Aug 1952.

11. Msg, Chidlaw to White, 25 Jul 1952, (Doc 139).

12. 2d Ind, ADC to USAF, 22 Aug 1952, to Ltr, ADC to USAF, "Selection of AEW&C Bases," 3 Jun 1952, (Doc 138).

13. R&R, P&R to Staff, "AEW&C Program," 26 Nov 1952, (Doc 140).

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caused great anxiety. The most pressing requirement for an AEW&C unit was on the East Coast, to insure adequate advance warning for the vital New York - Washington area. Consequently, the need for adequate facilities at Otis AFB was a paramount concern. In order to insure construction in proper time, ADC recommended that funds in the first supplement to the FY 1953 Budget be allocated for this purpose.[14] As ADC's Deputy Chief of Staff for Operations pointed out:

> "We receive our first aircraft in April 1953, but will have no facilities for many months. We can't justify several hundred million dollars without being assured of the full operational capability from every piece of equipment when we get it. We feel that . . . . . the most critical facilities at Otis must be included in the Fiscal Year 1953 first supplemental construction program."

The problem of a timely acquisition of the necessary facilities at Otis was aggravated by the fact that under the original five-base plan, a small hangar at Larson AFB, and another at Presque Isle, AFB had been included in the FY 1953 Budget for the AEW&C program.[15] The change in plans necessitated difficult and time-consuming alteration of these fiscal documents. The hangars at Larson and Presque Isle would have to be deleted, and the required facilities at Otis and McClellan, much more extensive, would have to be substituted. The inclusion at that late date of supplementary expenditures in the FY

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14. R&R, Bergquist to Smith, 2 Aug 1952, (in AEW&C Project File, P&R, ADC).

15. Transcript of ADC Briefing for Gen Roger Browne, 12 Aug 1952, HRF B106.

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1953 Budget was easier said than done. Headquarters USAF was unable to satisfy ADC in this matter. Although in September 1952 the Air Force Council had approved the two-base concept, and deleted the Presque Isle and Larson hangars from the current budget, construction funds for Otis and McClellan were not substituted for these. The best that USAF could do was to include the necessary funds in the FY 1954 Budget "after review by air staff and installation boards."[16] Operational funds were to be provided in the FY 1954 Budget "consistent with the phasing-in of the program" and its growing operational capability. Nothing daunted, however, ADC made some progress in this direction by redistributing some of its M&O funds for the beginning of minimum construction facilities at the two bases.[17] The race between facilities construction and the production schedule at Lockheed promised to be a close one.

IV

The RC-121C and D aircraft destined for AEW&C use, was a Super-Constellation, manufactured by the Lockheed Aircraft Corporation of Burbank, California.[18] A "flying electronic nightmare," it was to be

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16. USAF Memo, "Implementation of AEW&C Program," 29 Sep 1952, (in AEW&C Project File).

17. Interview, Historian with Maj C. E. Wiles, ADC, P&R, 5 Jun 1953.

18. Lockheed Aircraft Corp., "Airplane Data RC-121C Airborne Early Warning and Control," 15 Aug 1952. This publication is an excellent descriptive account of progress in the construction of the aircraft with full details of its specification and estimated performance. (In ADC, P&R, AEW&C Project Files).

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equipped with the AN/APS-20B search radar, manufactured by the General Electric Company, housed in a huge radome slung from the underside of the aircraft fuselage. The height-finder was to be the AN/APS-45, produced by the Philco Corporation, housed in a tall radome projecting from the top of the fuselage. Both of these abnormal appendages caused, it goes without saying, considerable concern about aerodynamics. In addition to these equipments, a great deal of secondary communications and other gear was to be included.

The original number of aircraft called for in the AEW&C program was based on the earlier five-base plan, calling for ten aircraft operating from each of five bases, and six additional aircraft for command support and attrition.[19] The first ten of these aircraft were to come from the Military Air Transport Service, and were to be retrofitted at the Lockheed plant.[20] When ADC revised its deployment plans in February 1952, to ask for six squadrons of ten aircraft each at two bases, the requirement was thus raised to sixty operational aircraft plus an additional but undetermined number for attrition.[21] Production figures were adjusted to conform to this new requirement for additional aircraft.

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19. ADC to USAF, "Airborne Early Warning and Control," 2 Jan 1953 (in ADC, AEW&C Project Files).

20. Msg, AMC to ADC, 18 Dec 1951, (Doc 141; ADC, "Report of AEW Conference," 13 Feb 1952, (in Hqs ADC, O&T Files, 34-7).

21. As in fn 19 above.

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The question of production schedules of AEW&C aircraft and its assorted electronic gear arose to plague the Air Defense Command, just as production schedules had raised havoc with previous ground-radar programming. Depending on the manufacturer's speed, air base facilities and personnel were to be phased into the AEW&C program. The operational capability of the RC-121C depended upon three principal manufacturers and a number of contractors and subcontractors of specialized components. As was noted, Lockheed, General Electric and Philco were responsible for the production of the prime components. In consequence of the production effort being so widely dispersed, production estimates fluctuated constantly. Late in 1951 ADC was informed that its first aircraft would be available in March 1953, but delivery schedules were revised downwards until by the end of 1952 ADC was obliged to expect receipt of the first aircraft not earlier than November 1953. Late in 1952, it became apparent, moreover, that Lockheed's schedules as to aircraft production did not guarantee the timely production of radar gear by General Electric or Philco. The possibility arose of the aircraft being available to ADC in the future without the installation of the necessary electronic equipment.

V

After the resolution of the two-base controversy, ADC proceeded with alacrity to draw up plans and schedules for activation of the groups and six squadrons at McClellan and Otis. In the allocation of

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the first units and aircraft, Otis AFB was given first priority by ADC because of its strategic importance. In July 1952, while ADC was still awaiting official USAF acceptance of the two-base plan, tentative plans indicated that the first AEW&C unit was to be established at Otis by 1 July 1953, with the second squadron being activated at McClellan in January 1954.[22] By November 1952, it was quite apparent that speedy action on the preparation of Otis AFB would not be forthcoming in time to enable ADC to receive the first aircraft and personnel, and that it would, consequently, be necessary to substitute McClellan for Otis for the first unit to be activated in July 1953.[23] The McClellan unit was to remain on the West Coast until April 1954, when it would move to Otis. A portion of the personnel of this first unit would be detached in January 1954 to form the nucleus of a second AEW&C squadron which would remain at McClellan after the parent unit moved to Otis AFB. The next two squadrons were to be activated at Otis and the last two at McClellan, thereby carrying out ADC's original priority for the East Coast site in the general activation schedule. Inevitably, however, slippages in production forced a postponement of the activation date for the first squadron until 10 October 1953.[24] In the meantime, ADC Headquarters was grooming the personnel of its

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22. ADC Diary, 29 Jul 1952, HRF 901.

23. ADC Current Planning Activities Report, 13 Nov 1952, HRF 902.

24. ADC to USAF, "Airborne Early Warning and Control," 2 Jan 1953, and Inds (in ADC, P&R, AEW&C Project Files).

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AEW&C Project Group, who were engaged in monitoring the program at the headquarters, for command of the first unit at McClellan.

As was to be expected, the matter of obtaining the necessary number of personnel to operate and maintain the AEW&C program was fraught with difficulties, especially in view of the increasing manpower economies being effected in Headquarters USAF. The original five-base program of 1951 had authorized ADC a total of 2,525 troop spaces for the entire program.[25] With the approval of the two-base plan in 1952, the total was raised to 4,582 personnel for the complete program - which personnel was to be "phased-in" to conform with aircraft deliveries, beginning in 1954 FY and continuing through FY 1955.[26] The phase-in of these personnel was predicated on certain operational concepts. Beginning in FY 1954 each aircraft was authorized 12 crew members, and 1.2 crews. This condition was to last until the second quarter of FY 1955 at which time the crew members were to be increased to eighteen and the number of crews to 2.5. Prior to the second quarter of FY 1955, the aircraft were to be operated on a flying hour allotment of 100 hours per month per aircraft, and after that period, the AEW&C program would swing into full operation at 172 hours per month flying time per aircraft.[27]

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25. ADC, Current Planning Activities Report, 7 Oct 1952, HRF 902; R&R, P&R to Staff, 26 Nov 52 (in ADC, P&R, AEW&C Project Files).

26. R&R, P&R to Staff, 26 Nov 1952 (in ADC, P&R, AEW&C Project Files).

27. Ibid.

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On reaching a group UE strength of thirty aircraft at Otis in FY 1955, the existing units, organized as T/D units, were to be reorganized under a T/O for an AEW&C group on the model of a T/O prepared by Headquarters USAF at the time of the approval of the two-base concept. The second group at McClellan was to be reorganized under the same T/O when it reached its full UE strength.[28]

VI

It was quite natural in view of the uncertainties of delivery of equipment, and the fact that the AEW&C aircraft was a new and highly specialized project, that ADC should express grave concern about the quality of personnel entering operational and maintenance duties in the program. It was also quite natural that, in its anxiety, ADC should turn to the Navy for assistance, in view of the latter's greater experience in the development of airborne early warning radar.

The Navy had for several years conducted AEW training in its installation at Patuxent, Maryland, where the Fourth Air Development Squadron was located. There ADC sought to send several of its qualified personnel for indoctrination in December 1951, as well as to the Naval Special Devices Center at Sands Point, New York, where pioneer work on the control function of the AEW&C program was being undertaken.[29]

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28. ADC to USAF, "Airborne Early Warning and Control," 2 Jan 1953, (in ADC AEW&C Project Files).

29. ADC to USAF, "Placement of Radar Technician Personnel on Temporary Duty with the Navy Air Development Squadron (VX-4) Patuxent Naval Air Station, Maryland," 14 Mar 1952, (in ADC, P&R, AEW&C Project Files);R&R, P&R to DO, 31 Oct 1952, (in ADC AEW&C Project Files); ADC to Navy Special Devices Center, "Airborne Early Warning and Control," 1 Dec 1952, (Doc 142).

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It was successful in both instances. In addition, ADC was fortunate in having a limited number of Philco "technical instructors" under its supervision who had had some experience in Naval AEW&C aircraft, and plans were made to assign eight Philco instructors to each of the new AEW&C Groups for instructional purposes in the anticipated on-the-job training program to come.[30]

Basically, the AEW&C training program was a joint enterprise conducted by the Bureau of Aeronautics of the Navy Department, and the Air Training Command of the Air Force, with the contractual assistance of the Lockheed Corporation and representatives of manufacturers of the electronic components.[31] Originally, it was envisaged that training would be undertaken at the Fleet Airborne Electronics Training Units on the two coasts (FAETU), and then at the Philco, General Electric and Lockheed plants. By the end of 1952, however, plans were firmed for the centralization of the training effort on the West Coast at the FAETUPAC at San Diego, for sixteen weeks of basic electronic training in airborne equipment -- the graduates then proceeding to Lockheed where a general training in "systems" operation would be held.[32] Instructors from Philco and General

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30. R&R, P&R to PTR, "Technical Instructors for AEW&C Units," 16 Sep 1952, (in ADC AEW&C Project Files).

31. USAF to ATC, "Airborne Early Warning Training," 15 Jan 1953, (in ADC AEW&C Project Files).

32. BuAer to CNO, 23 Jan 1953, (in ADC, P&R, AEW&C Project Files).

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Electric would perform their services at the FAETUPAC center. The Program would, in effect, be under the joint supervision of the Air Force and the Navy, even though the Navy possessed the training contracts with the civilian manufacturers. The Air Force was to furnish instructors, funds and equipment on a proportionate share basis.

As the year progressed, ADC's plans for the operational employment of the AEW&C aircraft began to require elaborate restatement to conform with newly acquired information absorbed during the year. The plan submitted in February 1952, though still the basic statement of ADC's ambitions for the AEW&C program, was manifestly limited as an operational guide. In the fall of 1952, consequently, ADC embarked upon a more comprehensive formulation of doctrine and concept. The new study was expected to see the light of day sometime during the following spring.

VII

During the last six months of 1952, ADC continued to experience disappointment in its oft-repeated requests for the provision of radar-equipped picket vessels for offshore patrol duty. It has been mentioned in previous histories of ADC that picket vessels were required in order to extend the coverage afforded by the shore-based radars and to provide check points for inbound trans-oceanic flights for identification purposes.[33] The Navy had expressed sympathy with

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33. ADCHR #1, pp. 244-248, 368-9; ADCHR #2, pp. 40-43; ADCHR #3, pp. 47-49.

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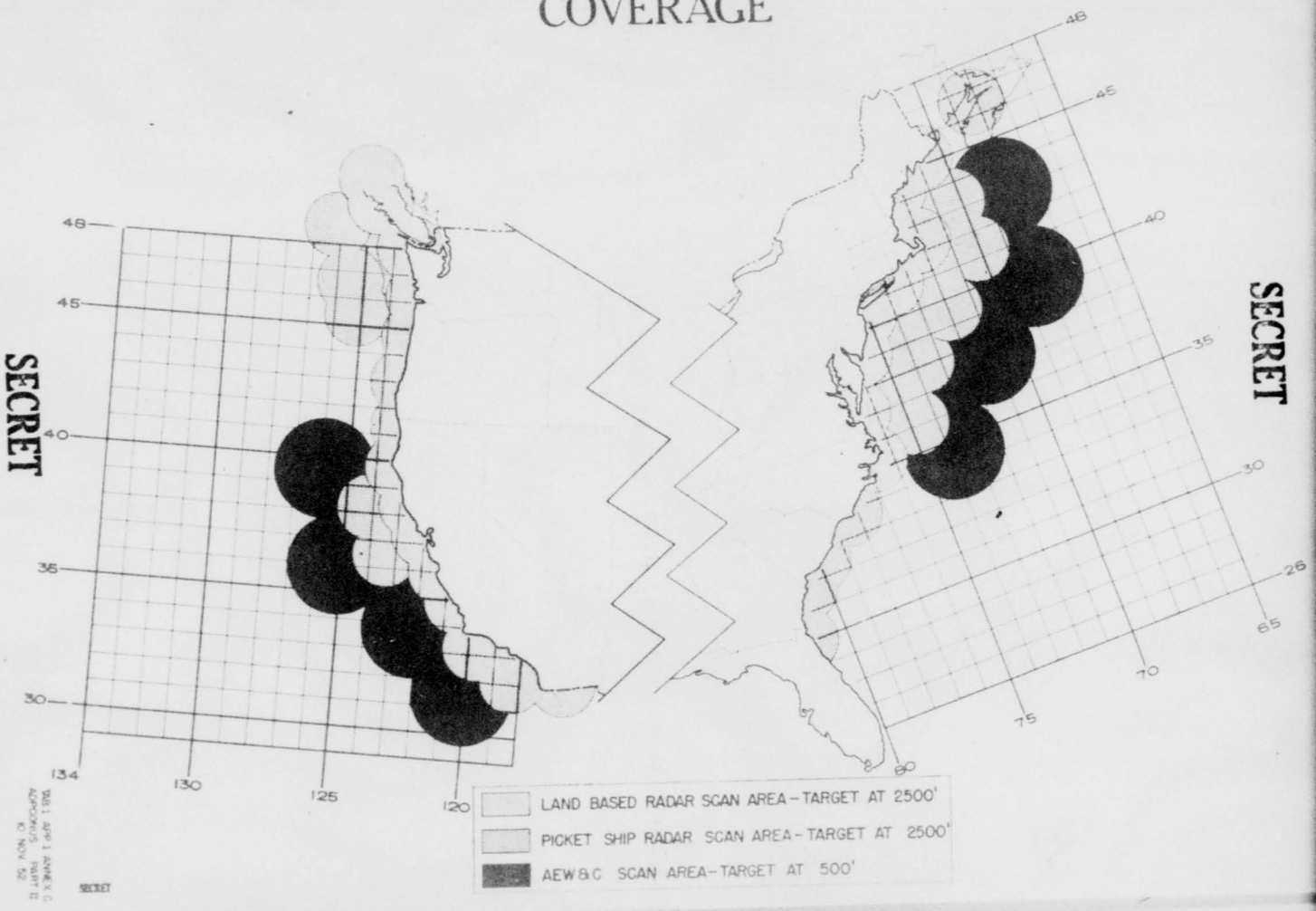
PROPOSED PICKET SHIP AND AEW RADAR COVERAGE



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ADC's predicament, but was unable to satisfy ADC's requirement for an immediate and continuous capability. The Navy's offer to provide the necessary facilities on 24-hour notice was unsatisfactory to ADC, and in desperation, the command had suggested to Headquarters USAF the possibility of USAF-manned merchant ships equipped with the necessary electronic gear.[34] This suggestion died a quiet death in higher headquarters, and ADC was left in the same predicament it had been in 1949 at which time the request for radar-equipped vessels had been first broached.

Although ADC remained unsatisfied with the lack of tangible progress in its important requirement, there were intimations in the latter months of 1952 that the Navy was becoming more amenable to the requests for picket vessels. In September, the Navy informed ADC that "in order to develop techniques and procedures for the employment of Naval picket vessels" one radar picket station off the Atlantic coast was to be manned continuously, with another station in the same area to be manned on an intermittent basis.[35]

Although the provision of a single Naval destroyer for experimental purposes was a step in the right direction, in ADC's view, the capability afforded by this vessel was practically negligible. In previous months, EADF had had the opportunity to test the effectiveness of picket vessels provided by the Navy from time to time,

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34. ADCHR #3, p. 49.

35. Msg, USAF to ADC, 12 Sep 1952, (Doc 143).

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and the results of such tests revealed obstacles to the timely communication of surveillance data from ship to shore which detracted from whatever surveillance capability was added by the presence of the vessel.[36] Similar results were experienced with the continuously-operated destroyer provided by the Navy in September. Tests indicated that the daily average of all messages from the picket ship to the receiving AC&W sites was twenty minutes.[37] The reason for this state of affairs was the fact that communications frequencies were being furnished by the Chief of Naval Operations from existing frequencies assigned to the Navy. However, no frequencies had been assigned the Navy or ADC for picket-AC&W station use for air defense purposes. Messages were transmitted on a "priority" basis. There was not even the satisfaction afforded by transmitting in an "operational immediate" category, because the latter method was not authorized for air defense purposes on the employed frequencies. EADF reported that though the Navy had attempted to solve the problem "to date no method has measured up to air defense requirements."[38]

In September 1952, the Lincoln Laboratory proposed that offshore towers located on shoals along the coasts be substituted for picket vessels.[39] Although the locations of these shoals along the

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36. History of EADF, 1 January-30 June 1952, p. 9.

37. Msg, EADF to USAF, 19 Dec 1952, (Doc144).

38. Ibid.

39. ADC to USAF, "Extension of Radar Coverage in the Northeast Coastal Area," 24 Sep 1952, (Doc145).

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Atlantic Coast coincided approximately with four of the five Atlantic picket stations proposed by ADC, the command refused to substitute this proposal for the picket vessel program. ADC did note, however, that the Lincoln report "had considerable merit and proposes to be an economical partial solution towards meeting picket vessel requirements."[40] ADC recommended, consequently, that the proposed off-shore stations be considered along with picket vessels as a means of fulfilling the urgent requirement for seaward extension of radar coverage. By the end of the year no further information was forthcoming on the status of the Lincoln proposal.

On 23 September 1952, the CNO injected a controversial note into the entire project to extend ADC's radar cover to seaward. In a letter to pertinent naval units, comments were requested on the desirability of "establishing, within the operating forces, two additional commands, one in the Atlantic and one in the Pacific, to perform continuous picket functions in support of all military commanders whose primary missions require surveillance and/or other supporting action in the Atlantic and Pacific Oceans."[41] After admitting that the requests of the Chief of Staff, USAF for radar pickets vessels were entirely justified, CNO noted that the Commanders in Chief, Atlantic and Pacific "in their unified command positions"

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40. Ibid.

41. CNO, OPNAV Notice 003320, 23 Sep 1952, with attached R&R, P&R to DCS/O, 19 Nov 1952, (Doc 146).

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were "responsible for defense against attacks on the United States which may develop through the Atlantic and Pacific Oceans, respectively."[42]

The CNO pointed out that "Naval picket forces in the Atlantic and Pacific, if established, will be comprised of various types of Naval units, such as surface units, AEW and ASW aircraft, integrated in accordance with established Naval doctrines and procedures and positioned in the Atlantic and Pacific Oceans so as to support all interested commands with maximum effectiveness and a minimum of duplication of effort."[43] The ultimate locations of the picket forces, stated the CNO, "may or may not be within the seaward areas delineated by [ADC]."[44]

On reading the OPNAV Notice from the CNO, personnel of Headquarters ADC expressed gratification that the Navy was on the verge of taking a concerted action to provide early warning along the vital coastal areas. However, there was an almost uniform skepticism in Headquarters ADC as to the mechanics of Navy control over picket vessels and Airborne Early Warning aircraft. As Major General Frederic H. Smith, Jr., ADC's Vice Commander stated: "The key lies in the method of operation, the relative priorities established in the mission directives which would be given to the picket forces,

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42. Ibid.

43. Ibid.

44. Ibid.

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and the relationship established between the Commanding General, Air Defense Command, and the picket force commanders, in-so-far as the over-all air defense mission is concerned."[45] By the end of December 1952, the controversy initiated by the CNO on the matter of jurisdiction over the "picket forces" had not reached a definite climax. ADC was prepared to witness a protracted debate on this matter between the Navy and the USAF on JCS level. In the interval implementation of the request for ADC-controlled picket vessels threatened to hang fire pending resolution of the controversy over jurisdiction.

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45. RGR, WC to D/O, 1 Dec 1952, (Doc).

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CHAPTER EIGHT

THE GROUND OBSERVER CORPS

I

The last six months of 1952 witnessed certain important innovations in the operation and organization of the Ground Observer Corps. On the 14th of July 1952, a new program affecting the operation of the GOC was set in motion by the Air Defense Command. This program, implemented as Operation SKYWATCH, was directed toward the goal of achieving a more effective integration of the GOC into the existing air defense system.

It had long been a notorious fact that the Aircraft Control and Warning System was dangerously deficient in its ability to detect low-flying aircraft. The radar equipment in use in the surveillance screen in 1952 was operationally limited by the inability of the radar beams to follow the curvature of the earth. This "line-of-sight" characteristic of radar caused numerous gaps to appear in the radar coverage when the stations were deployed as far apart as they were, i.e., 120 miles on the average. The numerous low-altitude gaps had been anticipated early in the history of air defense planning, and provision had been made for the establishment of a corps of civilian volunteer observers, organized as the Ground Observer Corps (GOC). Until mid-1952, the GOC had been operated, however, as a "standby" element, i.e., posts had been organized,

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but were not called upon to operate as part of the air defense net on a continuous around-the-clock basis, except for an occasional exercise.

The serious disability of the surveillance screen at low altitudes aroused so much concern as time progressed, that the drastic step was taken in July 1952 to integrate as much of the GOC on a continuously operational basis as was possible.[1] The decision to do this was the result of much controversy, and many misgivings, on the part of those persons who were skeptical as to the enthusiasm of unpaid civilian volunteers to work long hours as sky-watchers. Nevertheless, the need was so urgent, and the alternatives so manifestly non-existent, that the die was cast.

Operation SKYWATCH, in brief, was based on the determination to place in continuous operation those observation posts which would do the most good for the active air defense system. In view of the fact that the most pressing surveillance requirement, besides the elimination of the low-altitude gaps in the radar cover, was early warning of the approach of a hostile raid, the decision was made to establish the SKYWATCH areas, i.e., the twenty-four hour operational posts, around the perimeters of the United States in the west, north and east. SKYWATCH, consequently, was to perform two important air defense functions: (1) insure early warning of an enemy raid at the frontiers of the nation, and (2) close the low-altitude gaps between the radar

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1. Actually the first attempt to implement Operation SKYWATCH had been made earlier, in April 1952, but had been abandoned when it met with opposition by state civil defense groups. See ADCHR #3, p. 272.

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stations in the border areas.

In enforcing these principles of operation, SKYWATCH was responsible for the activation of more than 6,000 observation posts and 32 filter centers on a continuously operational basis throughout an area embracing 27 states and the District of Columbia. Approximately 150,000 volunteers were involved in the plan, marking the first time that civilians had been placed on continuous duty as part of the air defense system since the end of World War II.[2]

As was mentioned, SKYWATCH involved only part of the existing Ground Observer Corps. Prior to Operation SKYWATCH 36 of the 48 states possessed ground observer posts. SKYWATCH organized the GOC of 27 states on a 24-hour basis. This left nine states which possessed GOC posts unaccounted for by the new program. In reality, the GOC of this nine-state area, which encompassed the central and southwestern hinterland of the country, remained on the same operational basis as that which existed before Operation SKYWATCH -- on a standby status. Twelve states continued to have no GOC at all. It was hoped, that in good time, GOC posts could be organized throughout the nation, but this was an objective that was still in the realm of the future.

II

Although there were few civil or military defense officials who doubted the need of such a program as Operation SKYWATCH, much opposition was encountered from several state directors of civil defense on

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2. TWX, ADC to Defense Forces, 12 Jul 1952, (Doc 147).

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the question of the necessity for immediate implementation of the program. Some of these persons requested postponements ranging from six weeks to six months. ADC was adamant, however, in the face of these objections, insisting that the threat to the country was real, and that the need for an immediate implementation of SKYWATCH was vital. It pointed out that if the threat to the country was serious enough to justify the continuous operation of the radar and fighter forces, it was serious enough to keep the third essential member of the defense team, the GOC, alerted on the same basis. The latter viewpoint prevailed, clearing the way for the start of the new program early in July.

As was almost universally expected, the most important obstacle to the implementation of Operation SKYWATCH was the recruitment of volunteers. Although it has been noted that SKYWATCH, in principle, was to convert the standby GOC posts in critical areas to a continuous operational basis, the terms of enrollment in the GOC were so drastically altered in those posts, that an entirely new recruitment campaign was necessary to insure that the posts would be manned. The major difficulty, of course, lay in the extended tours of duty which were required of the civilian observers in the critical areas.

The first step in ADC's campaign to recruit volunteers to man the SKYWATCH posts was the decision to institute a vigorously-pressed, nation-wide education program utilizing personal contacts, as well as all possible advertising media. A major problem in the successful prosecution of such a program was that of educating the public to the

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dangers of the current military situation, without resorting to "scare" tactics and without violating the bounds of national security.

ADC believed that the nation's air defense capabilities were generally over-estimated by the public. Cause for much of this misconception was laid to over-optimistic newspaper and magazine articles, especially those dealing with estimates as to the number of enemy aircraft which could penetrate our defenses in the event of an attack.

In view of the strides of modern technological development, doubt existed in the public mind as to whether ground observers were necessary at all, and widespread publicity given to new "wonder" weapons, added to the doubts. Governor Millard Caldwell of Florida, then Federal Civil Defense Administrator, emphasized the problem when he said that, "the people of Main Street believe that the Air Force can keep the enemy attacking planes, or a very high percentage of them, from getting through, and that is not a fact. The people on Main Street do not believe that their services are needed . . . ."[3]

III

The advertising campaign, conducted for the most part under the direction of the National Advertising Council, was well under way by September 1952, and embraced nearly all available advertising media. Although the campaign broke at an extremely difficult season, with elections, Thanksgiving and Christmas as competitive attractions, it became clear that some Air Force and Civil Defense units had been

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3. Proceedings of State Civil Defense Directors Conference, 16 Jun 1952, (ADCHR #3, Doc 201).

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heartened by the availability of these professional advertising tools. The filter center at Seattle, for example, ordered mats for 30 newspapers in the Northwest which were contemplating a continuing program.

A newspaper kit was mailed in October to daily, weekly, foreign language, labor and farm newspapers in the SKYWATCH area. Despite the formidable competition of the "get-out-the-vote" campaign, the Council reported that more than 3,000 orders for mats and tear sheets had been received and that reaction was definitely favorable. One advertising manager wrote "Good Copy" on his order -- an unusual occurrence. Another national newspaper mailing of some old and some new ads was planned as the period ended. The Council's plan for January called for providing the leading dailies with short editorial-type copy for use on page one, as well as split-page ads and other preferred presentations.

A radio fact-sheet was prepared and distributed in August and the first messages were carried on cooperative programs during the week of August 25-31. Programmed for radio during September were: one week of national allocations, one week of regional spot announcements, and one week of network programs.

Meanwhile the Air Force made direct distribution of personalized recordings to "disc jockeys" of 1,500 local stations and the Columbia Broadcasting System began the first of a series of special late half-hour shows devoted entirely to the GOC campaign. In addition to the two weeks of cooperative and two weeks of network programs in November, the "Esso Reporter" carried a GOC message on some 50 stations in the SKYWATCH area.

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Soon after the institution of SKYWATCH, the well-known commentator, Edward R. Murrow, devoted a major part of one of his "See It Now" television shows to a GOC documentary film and shortly afterward featured General Vandenberg with a strong GOC message. The documentary film, which ran 22 minutes, also was distributed to local TV stations.

Plans were complete for distribution of between 50,000 and 70,000 posters for transportation vehicles in 36 states. A total of 50,000 outdoor color posters were distributed to Air Force and Civil Defense agencies. In addition 50,000 proofs of two, 1,000-line, newspaper ads were being readied for local use at the end of the period.[4]

Air Force headquarters arranged for three photographic teams to cover the GOC effort, one team to be assigned for approximately ten days to each of the Defense Forces. The teams consisted of a Public Information Officer and motion picture as well as "still" photographers. Subjects concentrated upon were outstanding community participation, rural problems, and individual accomplishments.[5]

Finally, defense-related industries were supporting the GOC campaign in newspapers and national magazines. Lockheed Aircraft Corporation provided a good example with a full-page GOC ad which appeared in "Life," "Time" and other national magazines.

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4. National Advertising Council Status Report on GOC, 31 Oct 1952, (Doc 148).

5. TWX, USAF to ADC, 7 Aug 1952, (Doc 149).

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IV

Meanwhile, personal contact between Air Force representatives and the public was being emphasized in an effort to bolster recruitment. Representative citizens were invited to filter centers for presentation of problems of air defense; conferences and briefings for civil defense workers were held at various Air Force installations; teams of Air Force personnel were active in recruiting; and Air Force spokesmen addressed conventions such as those of the American Legion and the Veterans of Foreign Wars, requesting sponsorship of its program.

As initially planned, it was the state civil defense officials who were to assume the responsibility for recruiting. In many cases, however, the Air Force had to recruit through its own resources. In practical terms, the states were only helping the Air Force authorities. Therefore, notwithstanding the fact that they were leaving themselves open to criticism for usurping an authority that was not theirs, military officials drove toward their recruiting goals. To do this job the Air Divisions had two kind of specialists. In each state there was a coordinator, who was a field grade Air Force liaison officer. This official concentrated his energies on getting state-level cooperation from agencies and organizations. In addition, filter center teams of officer and airman instructors "beat the bush" for recruits in communities of their sectors. Despite the discouragements known to every salesman, their efforts produced positive recruiting results. In Portland, Maine, for example, the state GOC coordinator contacted

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the collector of United States customs. Through that interview 22 new observation posts were added at customs ports along the Canadian border.[6] A potentially rewarding program was developed during the last half of 1952 in Georgia. A plan was conceived by the Georgia State GOC Coordinator whereby aircraft spotters' clubs would be established throughout the Georgia secondary school system as an extracurricular activity. The plan was introduced to the Georgia Department of Education and the Department of Civil Defense and given quick approval. Under the plan a spotters' club was to be organized at every high school desiring to participate. While the plan had not been implemented at the end of the period, detailed plans had been outlined and passed on to other states by the Georgia Civil Defense Director.[7] As a net result of these varied forms of personal contacts county and state officials began to offer their cooperation more freely, and it appeared that future efforts at recruiting were bound to meet with greater success.

Another aspect of the recruiting process, the retention of those volunteers already a part of the system, increased in importance and was aggravated by the approach of colder weather. The loss, beginning in September, of volunteers of school age, added still further to the problem.

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6. History of 32nd Air Division, 1 Jul-31 Dec 1952, p. 73.

7. History of CADF, 1 Jul-31 Dec 1952, p. 271.

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The prospect of the continuation of SKYWATCH into the winter months caused lack of enthusiasm in many quarters, especially at State level. By September the states of Washington and Oregon had already disclaimed responsibility for recruiting and administrative support of the GOC, and support of the program for such states as North and South Carolina, Iowa, and South Dakota was doubtful.

As if civilian opposition were not enough, some Air Force Officers added more. In the opinion of a representative of the Central Air Defense Force, SKYWATCH should have been postponed until Spring. His point was that once the participation of the smaller communities was lost it could not be regained. A letter of resignation from a ground observer in the Milwaukee area exemplified the problem from a personal viewpoint:[8]

> To expect anyone to stand outside like that for any length of time is absurd.... The enclosure...offers protection, but one cannot see outside... no rain or storm coats, goggles or any such necessities are there... I am trying to do my bit, but the present policy is exasperating. Members of our corps have even offered their services free to build a good watch tower if furnished material, but no result... for physical reasons I will not be able to risk standing a watch until conditions are changed at the post.... (He sent one copy of the letter to his senator and one to the Milwaukee Journal)

Few, if any, of the problems went unnoticed at the highest level, as evidenced by remarks of General Chidlaw to a Defense Force Commander: "I realize that posts will drop out, volunteers quit and

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8. Mr. Harold Sheffield to Mr. Fred Catel, 3 Sep 1952, (Doc 150).

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there will be a lessening of operational efficiency as we get along into the winter. It is going to take a lot of effort to even hold together what we have, much less improve it, during the next few months, but it is a job that's going to be done."[9]

In spite of the considerable opposition, it was finally decided at a conference of State Civil Defense Directors in New Orleans that SKYWATCH, regardless of hardships involved, would be continued. It was further agreed that if the states could not or would not continue with the GOC program, that the Air Force would assume the responsibility for recruitment and administration, and continue with the strongest possible campaign for the indefinite support of SKYWATCH.

A continuing effort was applied by ADC to improve the GOC facilities and working conditions. Attempts were made to dislodge enough funds from Air Force appropriations for GOC needs, and increased equipment authorizations were sought. Higher supply priorities had been obtained, and the improvement of living conditions at filter centers was anticipated by the shipment of such items of furniture as lounge chairs, lamps, etc., scheduled for February, 1953.

Other means of improving morale and stimulating interest in the organization were employed. Late in October, ADC succeeded in obtaining authorization to approve local flights in USAF aircraft for GOC volunteers, selection of personnel being based on a system of

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9. Gen Chidlaw to Maj Gen Todd, CG WADF, 3 Nov 1952, (Doc 151).

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meritorious awards.[10] (Authorization had been received earlier to carry GOC personnel in USAF aircraft on official business).

Heraldic devices, including observer pins, hour bars, and other decorations for wear by GOC personnel, were authorized and in the process of procurement. More than 300,000 observer pins had been delivered to depots and distribution to detachments had been effected. Hour bars were awaiting official approval as were lapel buttons of a new type.

Some states included personnel of the GOC under the benefits of their State Workmen's Compensation Act in case of death or injury during GOC duty. (Such legislation was introduced in the 82nd Congress but died without action). In Connecticut the Attorney General ruled that the GOC was not a part of the State Civil Defense Corps, thereby making members ineligible for the benefits of workmen's compensation, but favorable action by the State Legislature in amending the State Civil Defense Act was expected in early 1953.[11] Similar legislation also was ready for presentation before the 83rd Congress.

A source of concern were gaps in the surveillance system that existed in isolated, unpopulated areas. With the realization that no civilian volunteer could be expected to move into such an area in order to act as a ground observer, ADC explored possibilities of obtaining at least partial or part-time coverage of those gaps. To that end

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10. ADC to WADF, "USAF Airplane Rides for GOC Volunteers," 20 Oct 1952, (Doc 152).

11. Mr. Wm. Hasketh to Gen Chidlaw, 31 Oct 1952, (Doc 153).

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agreement was reached with the Forestry Service whereby reports would be received from certain of their watch towers. More coverage was expected to result also from agreements reached with the Department of Interior for use of National Parks and Monuments personnel, and agreements with the Treasury Department for assistance from the Coast Guard.

A program was also put under way for the utilization of railroad employees, especially section crews, as spotters. Railroad officials were found quite helpful and willing to cooperate, readily offering the use of their communications facilities and authorizing participation by their employees while on duty. The Defense Forces explored this source to determine the status of telephone and telegraph facilities of the section crews, and the extent of their availability.[12] As a result of these activities, numerous observation posts were established in remote areas where otherwise it would have been impossible to obtain coverage.

V

Improvements of the military component of the GOC, both in number and suitability also were being sought. A request was made to the Director of Manpower and Organization, USAF, on 20 August 1952, for approval of revised Tables of Distribution for Ground Observer Squadrons. The proposed T/D was based on the workload and varied

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12. CADF to ADC, "Utilization of Railroad Crews in National Defense," 30 Jul 1952, (Doc 154).

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with each filter center. As a result, the authorization for airmen for the GOC was increased in December from 526 to 703.[13] Actual manning against this increase, however, had not been accomplished as of December. Officer manning was expected to decrease through June 1953 as a result of the release of Reservists from active duty.

A command-wide practice of using officers and airmen with low retainability, which resulted in an unduly high personnel turnover, was noted. This condition had an adverse affect on the GOC program, not only through the lack of productivity of Air Force personnel, but more so because it necessitated a continuing readjustment of civilian volunteers to new personalities at the filter centers. General Chidlaw cautioned subordinate commands that, as the built-up to the strength authorized under the new GOC T/D was accomplished, it must be done with officers and airmen who would remain with the system a maximum length of time.[14] The same policy was to apply to replacements. (The difficulty to be dealt with here was the fact that about 30 percent of the total Air Force personnel were overseas, which, with ten percent being in the "pipe-line," meant that approximately 40 percent were unavailable to the GOC).

In addition to the Air Force personnel directly assigned to the Ground Observer Squadrons, it was obvious that the entire military

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13. ADC Command Data Book, Dec 1952, HRF 900.

14. As in fn 9, above.

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establishment could contribute to the effectiveness of the GOC. Personnel were available and some facilities on military reservations were ideal as observation posts.

Accordingly, all Air Defense Command units within the SKYWATCH area were instructed to give direct support to the program by the use of personnel on 24-hour duty, such as security forces, Air Police, etc.[15] Shortly afterward Air Force installations of other commands became potential sites for observation posts when authorization was received from Headquarters, USAF.

VI

Authorization for participation by Army installations was quick in forthcoming. Especially so was the reaction of the Army Antiaircraft Command, whose Commanding General said to subordinate units, "Support of Operation SKYWATCH by units of this command to the fullest extent consistent with its primary mission is desirable as a manifestation to the general public of the importance accorded the program by the military services and of the willingness of the military services themselves to perform the function wherever it has suitably located personnel available."[16]

Sanction of the program by the Secretary of the Navy paralleled

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15. ADC to EADF, "Participation of ADC Installations in GOC System," 1 Aug 1952, (Doc 155).

16. Hq, AAA to AAA Comds, "Participation of ADC Installations in the GOC System," 1 Aug 1952, (Doc 156).

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that of Army authorities, although it arrived somewhat later. Some difficulty was encountered in liaison between Naval and Civil Defense officials. An observation post at Port Washington, N. Y., was closed by the New York State Director of Civil Defense on 9 December, "as a result of a lack of cooperation between the U. S. Navy and Civil Defense Forces."[17] According to the N. Y. State Civil Defense Director, the only location for the post available in the area from the standpoint of visibility and transportation was on Naval property, and the Navy forbade establishment of the post there. ADC took the stand that the action by Naval authorities was at variance with a previous agreement between the Secretary of the Navy and Secretary of Air and so stated in a communication to Headquarters, USAF.

Concrete results were soon noted from this inter-agency activity. A rise in the number of posts organized at Coast Guard and Forestry Service installations was shown. Filter Center teams were sent out to train military post personnel and by the end of the year hundreds of new posts had been added to the system from all these sources.[18]

In line with the idea that every possible source available for the purpose of detecting aircraft approaching the United States should be utilized, it was directed that personnel occupying the

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17. Lt Gen Huebner, N. Y. State Director of Civil Defense, to Brig Gen Minty, CG, 26th Air Division, 9 Dec 1952, (Doc 157).

18. History of EADF, 1 Jul-31 Dec 1952, p. 33.

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eight ADC-manned radar sites in Canada on a caretaker basis, should act as ground observers. Detailed instructions were forwarded those units.[19]

Meanwhile, the Canadian Ground Observer Corps was being regarded with concern by ADC in view of a drastic reduction of the former's proposed structure. Canada planned to eliminate the proposed GOC in New Brunswick, Prince Edward Island, and the southeastern part of Ontario. This could be reconciled with the impending implementation of the Canadian radar network but the lack of coverage in southeastern British Columbia, Alberta, Saskatchewan, Manitoba, and western Ontario was considered a serious mutual threat since neither the Canadian GOC nor the Canadian radar network covered these areas, which were astride avenues of approach to the most vital Canadian and United States industrial targets. With increasing emphasis being placed upon optimum organization of the United States GOC in the border states of Montana, North Dakota, Minnesota and Michigan, it was requested through the Canadian Staff GOC Officer that efforts be continued to obtain approval for expansion of the Canadian GOC across the mid-western section of Canada.[20]

At the same time, the GOC potential was being studied in other

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19. ADC to EADF, "Early Warning by Visual Observation," 27 Oct 1952, (Doc 158).

20. ADC to Canadian ADC, "Canadian GOC Organization," 22 Oct 1952, (Doc 159).

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areas outside the continental United States.[21] The Commanding General of the Caribbean Air Command was preparing for the establishment of a GOC in the area of the Panama Canal. Offering assistance, ADC volunteered to lay out a GOC network if a landline communications diagram of the Canal Zone could be furnished. General information on the operation of filter centers, and on the equipment necessary for GOC units was forwarded to the Caribbean Command.[22]

VII

Between July and December the operational structure of the GOC underwent important changes. Plotting equipment was improved; a plan for realignment of filter center and radar sub-sector boundaries was under study;[23] new detection devices were tested; reporting proce-

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21. The constant search for improved surveillance was proceeding in other directions, even outside the human and electronic fields. In the arctic regions the possibility of training dogs to serve as a means of warning was suggested by Mr. John M. McAnerney, Operations Analyst of Headquarters, EADF, who had spent several years in radar survey and siting work in Alaska. He said that sledge dogs of the Husky and Malemute strains had been known to detect aircraft sounds at ranges up to 40 miles. Mr. McAnerney cited an occasion when his survey party was in a small Alaskan village south of Fairbanks. On that occasion two single-engine aircraft flying below 5,000 feet were detected by the dogs "some 25 to 40 miles away," well before they became visible or audible to members of the party. "The postmaster of the village had told us that the dogs invariable set up a howl 15 to 20 minutes before a plan would arrive," he said. /ADC Comm Digest, Mar 1953, HRF 900/.

22. 1st Ind, 16 Aug 1952 to CairC to ADC, "Establishment of GOC," 2 Jun 1952, (Doc 160).

23. Where boundaries were dissimilar it sometimes became necessary for the direction center to tell tracks received from its associated filter center to adjoining direction centers, thus introducing an additional step in transmission of information.

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dures were overhauled; and most vital, the communications system was under extensive improvement.

Authorization for installation private-line telephones between filter centers and observation posts had been received earlier, authorization having been obtained for the installation of 3,000 telephones each in the fiscal years 1952 and 1953. Installation got under way in the latter part of 1952, with priority on those posts which were in the SKYWATCH area. Filter center detachments and the individual states assumed responsibility for the instruments. While procurement difficulties hampered this program to some extent at the outset, installation gained momentum late in the period and many areas were expected to have complete direct-line accommodations by early 1953. In December, EADF reported that approximately 1500 such telephones had already been installed in its region. This meant a large contribution to surveillance effectiveness, and permitted a more judicious spacing of observation posts.

In installing the telephones, a "cluster system" was devised under which an average of six or seven observation posts were linked together with a filter center on one circuit. The system provided for closer tracking surveillance and, in addition, for the progressive alerting of observation posts to the approach of aircraft. Such installation was authorized by ADC in areas where, due to high traffic density, it was more economical to install a multi-point, full-period circuit, than to receive reports via the toll system, and where in-

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stantaneous contact with the filter center was necessary. Detailed instructions were published by ADC on procedures; for example, posts connected in a common circuit were to be designated on the filter map table in a common color.[24]

As a model for testing the system, the Filter Center at White Plains, N. J. was selected. Delays in running the test were encountered for two reasons: first, was the lack of availability of certain telephone equipment, which sources of supply indicated would be cleared up by the end of the year; second, was the lack of a firm location for several observation posts. The latter conditions was forcefully brought to the attention of the New Jersey Director of Civil Defense.[25] In spite of the difficulties it became clear as the test progressed that the system enhanced considerably the surveillance capabilities of the GOC.

A comparison of toll charges incurred by active observation posts, particularly in areas of heavy traffic, revealed that costs under the toll system were in excess of those required for installation and operation of a private-line circuit. Consequently, the Defense Forces were instructed to conduct a survey within the SKYWATCH area to determine which groups of exceptionally active posts should be formed into multi-point circuits. Initially, consideration was to be given to posts having a toll rate of $1,500 or higher per year,

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24. ADC Reg 55-15, 8 Aug 1952, (Doc 161).

25. Col Fletcher to Mr. Leonard Dreyfuss, 20 Oct 1952, (Doc 162).

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based on performance during SKYWATCH. (Average annual rental per post for a private line was $1525).[26]

Changes in the plotting equipment and reporting procedures were discussed at a Chicago conference attended by representatives of the RCAF GOC and ADC Civil Air Defense Directorate. These changes included: more definite reporting of aircraft by number; display of the actual time of observation in minutes; and reclassification by type of aircraft to include subdivisions of the existing identifying categories (bi-transport, multi-bomber, etc).[27] The latter proposed change was objected to on the grounds that such recognition was difficult even for highly-trained military personnel, let alone for partially-trained civilian volunteers.[28] The practicability of teaching civilian ground observers aircraft recognition should be investigated, the CADF Commander noted, first, by a study of the British experience; then, in the event the study proved inadequate, by designating a small portion of the SKYWATCH area as a testing ground for an aircraft recognition program.[29]

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26. ADC to Defense Forces, "Implementation of Private Line Networks," 19 Dec 1952, (Doc 163).

27. 1st Ind, 24 Nov 1952, ADC to EADF, "Defects in the Ground Air Observation," 12 Nov 1952, (Doc 164).

28. 31st Air Division to CADF, "GOC Reporting," 24 Nov 1952, (Doc 165).

29. CADF to ADC, "GOC Reporting," 28 Nov 1952, (Doc 166).

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Also under consideration was a plan for improved coordination between the GOC and the AC&W system. Previously, the main reason for lack of closer integration was the tremendous volume of reports from the GOC to the AC&W units. This was particularly true during exercises when the AC&W personnel found themselves incapable of coping with the great inflow of tracking data. Consequently, in many cases, AC&W personnel chose to ignore GOC data. Outstanding points of the proposed plan included the establishment of penetration zones, two to four observation posts in depth, around each Air Division area or vital target complex within Air Division areas; the reporting of only those flights indicating a penetration of the established zone to the ADDC; the institution in filter centers of dead-reckoning procedures as a temporary compensation for lack of established observation posts or unmanned posts; and scrambling of fighters by the ADDC on unidentified tracks generated by the GOC.[30]

Unit commanders concurred in general with the plan, but submitted counter-points. The WADF commander did not consider it advantageous to establish penetration zones around vital target complexes "since it would be generally impossible to provide adequate warning information to permit interception prior to reaching the bomb-release line."[31] Others expressed doubt as to the accuracy of

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30. Plan for Closer Integration of the GOC with the AC&W System, 27 Aug 1952, (Doc 167).

31. 1st Ind, ADC to WADF, 1 Oct 1952, to WADF to ADC, "Integration of the GOC with AC&W System," 27 Aug 1952, (Doc 168).

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dead-reckoning in filter centers and recommended thorough training, additional equipment, and the conducting of tests of accuracy.[32]

One of the Air Divisions, the 26th, conducted an experiment to test the procedures proposed in the ADC plan and the results gave cause for optimism. Along the periphery of the areas covered by the White Plains (N.Y.) and the Trenton (N.J.) Filter Centers, GOC penetration zones were established. The two filter centers were instructed to report data on only those flights which indicated a possible penetration, or which were in the process of entering the established zones. In addition, they were to forward track information on any flight as requested by the ADDC, or any flight marked by unusual occurrences. All areas other than the penetration zones were designated as "no-tell" areas.

The primary purpose of this experiment was to determine whether the amount of GOC intelligence passed to the AC&W system could be reduced to a manageable amount in an area characterized by high traffic density. The conclusion drawn at EADF was that the establishment of the penetration zones and "no-tell" areas was effective in reducing GOC information to a point where it did not overload the AC&W system, except during periods when air traffic was extremely heavy.[33]

An additional improvement in the detection capability of the

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32. 1st Ind, ADC to CADF, 30 Sep 1952, to CADF to ADC, "Integration of GOC with AC&W System," 27 Aug 1952, (Doc 169).

33. History of EADF, 1 Jul-31 Dec 1952, p. 38.

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GOC was in prospect with the scheduling of a demonstration of a new acoustic detection device at Headquarters ADC early in 1953. Known as IDC (Intelligence Data Collection) equipment, the device was designed to reduce hardships caused by adverse weather and to reduce the time spent in standing watch at observation posts. Its value was in providing an indoor listening system at regular GOC posts by reproducing and amplifying aircraft noises picked up outside and in providing an alarm activated by the noise of aircraft present in the area.

These components depended upon an external "ear" to pick up the sounds, amplify them for reproduction over the indoor speaker, or filter them for triggering the alarm. With the "ear" remoted up to 200 feet in an outdoor location, the system would make it possible for observers to remain indoors and, in some instances, pursue more or less normal occupations. In each of the above applications, visual identification would be necessary after the initial alert, but meanwhile the observer would have been spared lonely, uncomfortable hours of outdoor vigil. This convenience aspect figured strongly in ADC's evaluation of the device.

While the device was not regarded as a final answer, its possibilities were sufficiently strong to cause the Office of Civil Defense at ADC to express the desire to have equipment of this nature on procurement in substantial numbers by October of 1953. The OCD requested that similar, improved equipment be made an air defense requirement.[34]

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34. ADC C&E Digest, Mar 1953, HRF 900.

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VIII

Tests conducted throughout the six month period, while by no means attesting to the complete adequacy of the detection capabilities of the GOC, indicated progress. In a test called Operation BLUEBIRD, one B-29 departed from Hamilton AFB at daybreak on 25 September 1952, and flew over the SKYWATCH area along a route through the states on the Canadian border to Griffiss AFB, N. Y. Another B-29, taking off from Griffiss, flew approximately the same route from east to west and landed at Hamilton. The following day the exercise was repeated, the B-29's returning to their home bases. Only GOC reports were used to track the aircraft.

Results of this test showed that, while complete tracking was far from accomplished, a definite track was established on the east-bound flight. This track was based on reports from approximately 50 percent of the observation posts along the flight path. Considering the fact that the B-29 maintained an altitude of only 1,000 feet, retention of the track was considered an accomplishment.[35]

Of the several local detection tests flown during the period, two, conducted in the EADF area in August and October, brought out several weaknesses of the GOC.[36] In these tests, elements of the GOC were notified in advance, and flights were made only during daylight hours under favorable weather conditions.

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35. History of CADF, 1 Jul-31 Dec 1952, p. 269.

36. History of 32nd Air Division, 1 Jan 1952-15 Feb 1953, pp. 87-88.

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During the August exercise, penetrations were made in the area of the 32nd Air Division by Naval aircraft at very low level, at high speed, and in formations of eight planes. After an examination of the results of these tests, it was felt that the GOC did not rise to the occasion except in isolated instances. In the first place, insufficient posts were active for adequate tracking. Some tracking, notably in the Buffalo area, was sufficient, but the majority of tracks were too short for further action. This mission emphasized an old, inherent weakness of the system: the lack of confidence in GOC information at the ADDC's.[37]

The other exercise, again in conjunction with Naval aircraft, was conducted in the same area over a five-day period beginning October 27. From a standpoint of ground observer effectiveness, it also was rated unsuccessful. Aircraft were known to have penetrated areas where posts were operational, but from which no reports were forthcoming. In addition, a disturbing number of tracks were incorrectly reported as Navy strikes. The ground observers obviously had difficulty in differentiating between regular commercial traffic and Naval aircraft.

Controversy arose over the value of such missions. The Commander of the 32nd Air Division recommended that, until gap-filler

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37. ADC's C&E Digest of March, 1952 contained pertinent comment on this point: "No observer reporting system could ever hope to give information as fresh as the last sweep of the radar scope. Intelligent use of GOC reports did not lay in unfavorable comparison with the speed of radio energy. Its worth lay in the inherent limitations of radar, the economic impracticality of full radar coverage and the backup possibilities of the GOC system."

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radar was in place, such missions be avoided. Others took the longer view that the ineffectiveness of the missions proved a need for more of the same.[38]

In summation, the results of Operation SKYWATCH during its first six months should be evaluated on a purely relative basis. Viewed from nearly every aspect, it could be said of the GOC structure under SKYWATCH, that while it had improved to some degree, it was still inadequate.

From an organizational standpoint, some progress was made. As of July, 8,057 posts in the entire GOC had been organized; as of December, 8,673.[39] That, however, was still far short of the number of posts required to operate the total system—over 14,000. Moreover, a large percentage of posts organized were still undermanned; and many posts in operation in the SKYWATCH area, although on a 24-hour basis in theory, were in operation only during daylight hours.

From a training standpoint, relatively little progress was made. When the six-month period began, volunteers enrolled as workers at filter centers were 54 percent trained; enrolled observers 59 percent trained. As the period ended, filter centers workers were 69 percent trained; observers 61 percent trained.[40]

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38. As in fn 35, above.

39. ADC Command Data Book, Jan 1953, HRF 900.

40. Ibid.

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From a personnel standpoint, the GOC did little better than hold its own. The 150,000 volunteers in the system when the operation began was still a good approximation of those available in December. The number of volunteers at filter centers decreased slightly; the number of observers increased slightly. This holding of the line, however, was accomplished under great difficulties. The approach of winter eliminated many "fair weather friends." The institution of 24-hour duty hurt recruiting. Also SKYWATCH had had a shaky start after postponements, misunderstandings, and much disagreement.

From a standpoint of public education, it was worthy of note that the first phase of the advertising campaign was not expected to bring crowds of volunteers rushing to the colors. Instead it was intended as an educational program.

From an operational standpoint, the benefits of what progress had been made were more likely to be in evidence in future months rather than in the July-December period of 1952. The structure of the GOC was undeniably improved by its expansion into new fields, and by the improvement in its facilities. Scores of tracks, based on reports from individual observation posts in the field, reporting on low-flying aircraft not previously picked up on ADC's radar net, were being fed into the air detection system. Correlation between tracks reported by the GOC with those reported by ADC's radar network had indicated improvement in GOC reporting.[41] While the opera-

41. TWX, ADC to Defense Forces, 18 Jul 1952, (Doc 170).

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tional tests of GOC capabilities under SKYWATCH showed glaring weaknesses, it was nevertheless more desirable than a standby system under which members required hours, even days, of advance notice before any posts were manned.

In conclusion, the GOC under SKYWATCH, had made limited progress toward its goal of operational efficiency during the last six months of 1952. But if it was to become an organization that could be relied upon to plug the low-altitude gaps in the air defense system, there still remained a long-hard road to travel.

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24	S	The performance of F-5 hand F-47V Aircraft at altitude and their effectiveness against the B-50 Bomber, 17 Mar 1951	6
25	S	R&R, DCS/O to IG, "Summary of Inspections of 2nd, 121st and 142nd Fighter Interceptor Squadrons," 12 Aug 1952	1
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30	S	ADC to WADF, "Coordination with Aircraft Command," 13 Oct 1952	2
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36	S	ADC to USAF, "Development of a "Quick Fix" Large Unguided Air-to-Air Rocket (Terror)," 13 Aug 1952	4
37	S	ADC to USAF, "Program for the "Quick Fix" Large Unguided Air-to-Air Rocket (Terror) 4 Dec 1952	1
38	S	ADC to USAF, "Development of a Quick Fix" Large Rocket," 29 Nov 1952, with 1st, 2nd, and 3rd Inds	5
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46	C	Memo from Gen Vandenberg to Deputy C/S," Proper Utilization of Resources," 22 June 1951	2
47	S	USAF to ADC, "Civilian Personnel Requirement Department of the Air Force Fiscal Year 1954 Budget Estimates." 23 May 1952	2
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98	C	USAF to CG, APGC, "Comparative Operational Suitability Test of Photographic Projection Systems," 18 Apr 52	2
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106	S	Gen Twining to Gen Chidlaw, 13 Nov 52	2
107	C	ADC to EADF, "Air Defense Integrated System for Surveillance and Weapon Control (ADIS) Test Sector," 1 Dec 52	2
108	S	Set of Ground Rules in Selecting Sites for Revised Mobile Radar Program, n.d.	1
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124	S	ADC to RCAF ADC, "Mobile Radar Program (Second Phase)," 5 Dec 52	2
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