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HEADQUARTERS
AIR DEFENSE COMMAND

SEMI-ANNUAL HISTORICAL REPORT

NUMBER 2

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NARRATIVE

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PREPARED BY
THE DIRECTORATE OF HISTORICAL SERVICES
OFFICE OF THE ADJUTANT GENERAL

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CHARTS, MAPS, AND GRAPHS

CHAPTER ONE

AIR DEFENSE ASSUMPTIONS AND STRATEGY

I

The development of the long-range bomber and the discovery of the atom bomb during World War II did not alter the Air Force's belief in the principle that the best defense was an overpowering offense. Evidence of this was the fact that the bulk of Air Force appropriations after the war went into the construction of a powerful strategic bomber force. At the same time, however, increasing attention, because of the tremendous destructive potential of bomber transported atom bombs (plus the twin spectres of biological and chemical warfare), came to be given to the establishment of an active continental air defense system.

As early as 1946 the Air Force was convinced of the validity of the following assumptions with regard to the potential enemy of the United States and to the nation's vulnerability to attack by that enemy: (1) Russia, for very obvious political and economic reasons, was the most likely opponent of the U. S. in any third world war; (2) that nation, once it had discovered the secret of the atom bomb and had built up a stock-pile of these weapons and had improved upon its already large strategic bomber force, would possess the capability to attack by air any part of the U. S.; and finally, (3) Russia would not hesitate to deliver this attack without prior declaration of its

intentions whenever that nation considered the chances of victory to be in its favor.

Providing these assumptions were valid, the Air Force believed that the U. S. was in a far more precarious position in peacetime than it had ever been during World War II. At any moment an attack might be delivered on the U. S., an attack conceivably savage enough in its initial phase to cripple the nation beyond recovery. If the U. S. were to prepare to defend itself against such an eventuality, it had to maintain in peacetime, in addition to a powerful retaliatory strategic bomber force and a "combat ready" industrial capacity, a constantly vigilant air defense system.[1]

In consonance with this conviction, the Air Force included air defense in official doctrine as one of its three principal missions immediately following World War II. It also established, in March 1946, a major command having continental air defense as its primary responsibility. As told in the previous volume of the history, the Air Force then went ahead, in the face of insufficient support on the part of the Congress, to establish an active air defense system within the continental environs of the nation.[2] When the Congress turned

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1. One of many excellent early studies of the "problem" of air defense was: Air Defense Policy, a report to the C/S, USAF, by the Air Defense Policy Panel established by Chief Guided Missiles Group, 2 Feb 1948. A copy of this lengthy document is available in the Hq ADC Historical Reference Files (HRF) 102.

2. See ADC Semi-Annual Historical Report #1, Jun 1951 (hereinafter referred to as ADCHR #1). This work was printed and disseminated throughout the command for purposes of orientation and reference in Mar 1952 under the title, The Air Defense of the United States.

thumbs down on plan SUPREMACY, the Air Force took old World War II radars out of storage and commenced to set them where they could afford some service.[3] To increase the interceptor potential, ConAC was established and all of TAC's and ADC's fighters and several of SAC's fighter units were assigned to this command.[4] Thanks to these and other measures, by the time news of a Russian atomic bomb explosion seeped through the Iron Curtain, and by the time war broke out in Korea, there was the semblance of an air defense system in-being in the United States.

II

Before commencing actual construction of the air defense system, the Air Force studied, in the light of the above cited assumptions, the ways in which the U. S. could best be attacked by Russia through the air. The results of these studies dictated, in large measure, the siting of radars, interceptors and antiaircraft, the estimates drawn up for the types and numbers of air defense resources required, both initially and in the future, and the tactics to be applied to the repulsion of such an attack.

Primary considerations were what targets the enemy would select for his initial air attack and what approach routes he would choose for converging on these targets. It was deduced that the

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3. As in fn 2, see Part II.

4. As in fn 2, see Part III.

Soviets would strike first at areas encompassing as many strategic installations as possible - industrial, governmental, and population centers, SAC bases, and Atomic Energy Commission (AEC) installations. The areas affording such targets as these were the Northeast, the Northern Midwest - in the vicinity of the Soo Locks and the industrial complex in the Great Lakes region - and the Seattle-Hanford area in the Northwest. Logical approach routes to these areas from Soviet air bases in the vicinity of Murmansk and in Western Europe and Siberia would be over the northern pole and across Alaska and Canada.[5]

The air defenses which subsequently came into being were oriented to the north to meet the threat posed above. Additionally, emphasis was placed on extending the early warning capability of the system to the north and seaward by assisting the Canadian government to construct an air defense net and by seeking the acquisition of radar picket vessels and airborne early-warning aircraft.[6] If the hypothesis (stated by General Ennis C. Whitehead[7] in 1950) that ". . . we must channelize our thinking into the concept of preparedness of attack without warning. . ." were true, and there appeared no one to

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5. A full study - complete with charts, maps, and statistics - of the most likely U. S. target complexes to be selected by the Soviets for their initial attacks and of the most logical routes to be selected for making these strikes is contained in the Project RAND report, Air Defense Study, 15 Oct 1951.

6. For details, see chapters devoted to these subjects which follow.

7. General Whitehead retired as CG of ADC in 1951. For photo and brief biography see DOC 1.

contest it, extension of the system as far from the bomb release line over such border targets as Washington, D. C., New York, Detroit, Seattle, etc. by these means was absolutely mandatory.[8]

The types and numbers of bombers available to the enemy for dispatch on the initial and follow-up raids was a more difficult subject of analysis. The problem facing the planners of the continental air defense system in this respect was summed up as follows in an official study:[9]

> The problem . . . is characterized above all by lack of knowledge of what we have to defend against. The enemy has the initiative. Our intelligence tells us essentially nothing about his plans; informs us only partially about his present capabilities; and as to his future capabilities leaves us essentially dependent on assumptions that he can, if he chooses, do about as well in any aspect as we expect to do ourselves.

So far as the early air defense planners knew, and so far

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8. Whitehead to Maj. Gen. Willis H. Hale, CG 9th AF, 6 Jun 1950 (HRF 103). On the matter of the inability of the air defense system to rely on intelligence to provide advanced warning an early study reported: "Funds lavished on a really first-class intelligence system would buy more air defense for the continental U. S. than an equal quantity of money spent on any conceivable defense system. Even some A-bomb funds could be diverted to this effort without fear of incurring a net loss. The value of information regarding when, where or with what agent an enemy will strike would be incalculable. Every bit of intelligence regarding the composition and character of his forces is potentially of high value in war. It permits a reduction in the variety of counter weapons and an increase in the number which can be brought to bear. A great variety of skills can contribute to intelligence, most of them far removed from espionage." /Project RAND, "Active Defense of the U. S. Against Air Attack: A Preliminary Study of the Problem," 10 Jun 1947 (HRF 103)/

9. Final Report of Project Charles, Problems of Air Defense, 1 Aug 1951, p. 3. (Hereinafter referred to as Project CHARLES).

as was known in late 1951, the enemy's bomber capabilities consisted almost wholly of a force of some 400 to 500 TU-4s, bombers closely modeled on the U. S.'s B-29, several of which were "captured" intact by the Soviets during World War II. The TU-4 had a speed of approximately 345 knots, had a maximum altitude of 35,000 feet, and had a range of about 4,000 miles.[10] Concerning the ability of the Soviets to improve upon this model, one study of the problem stated that ". . . improvements in the performance of TU-4s are to be expected, and there are indications that larger bombers have been produced and may be available in significant numbers after 1953."[11] Another study of the problem believed that ". . . during the period from 1954 to 1958 . . . increased performance in range, speed and altitude will be achieved . . ." in Soviet bombers.[12]

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10. Project CHARLES, p. 3. Concerning the capability of enemy airborne radar, intelligence on this subject was meager. One study stated: "It is known that some Russian officers attended schools on airborne radar and visited manufacturing plants in the United States where our airborne radar was manufactured during World War II. Numerous airborne radars were sent to Russia on lend-lease, including SCR-717, SCR-720, and AN/APQ-13 equipments. It is understood that the Russians have developed 'native' versions of these radars." [1st Ind., ADC to EADF, 7 Feb 1952, to EADF to ADC, "Passive Detection," 15 Jan 1952 (HRF 632)]

11. Project CHARLES, p. 3.

12. USAF study, "General Operational Requirement for an Interceptor System for Air Defense 1952-1958," 27 Dec 1951 (DOC 2). During the Soviet Aviation Day Air Show in 1951 the Russians displayed a new bomber. It was termed the Tupolev 31, after the designer. The aircraft was larger than but similar in appearance to the TU-4. Its combat range was estimated at 3500 miles, its speed at 330 knots, and its altitude at 35,000 feet. [Hqs Alaskan Air Command, Intelligence Review, Jan 1952]

A realistic estimate of the strategy which the Soviets would employ in selecting the time for making an attack on the U. S. could be obtained from the SAC experts. Basing their assumption on how they themselves would go about such a mission, the latter stated:[13]

> If the Soviets are credited with the same degree of effectiveness in 1951 that we will have at that time and if they take advantage of the target information that they can easily procure on our vital installations, there is no question in our minds that their attacks would be delivered at night - unless of course, they figured on complete surprise for the initial attack.

It was also deduced that the enemy would select a time of year when conditions were such that a maximum of daylight hours prevailed in the Soviet Union to enable the enemy air defense system to combat the U. S. strategic bomber counterthrust under the best possible conditions. As explained by Brigadier General Kenneth B. Bergquist, ADC Headquarters, Deputy for Operations,[14]

> SAC has been the principal deterrent that has existed since 1946 against a war by Russia. Therefore, some consideration will be given by the Kremlin, so far as SAC's capabilities are concerned, in electing what part of the year to choose for the surprise attack against

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13. See correspondence between Brig. Gen. Herbert B. Thatcher, Deputy for Operations of ConAC and ADC prior to his assignment as CG WADF in Sep 1951 (for brief biography see DOC 3), and Maj. Gen. Thomas S. Power, Deputy Commander, SAC, Nov 1949 (DOC 4).

14. Report of the ADC Commanders Conference, 15-16 Oct 1951, p. 20 (HRF 106). (Hereinafter referred to as ADC Com. Conf., Oct 1951). General Bergquist became Hqs ADC DO following General Thatcher's assignment as CG of WADF. (For brief biography see DOC 5).

> the U. S. SAC's difficulty of penetration is going to be greatest during periods of long daylight and short darkness in Northern latitudes . . . /therefore/ the greatest danger exists from about 1 May to about 15 August, with preference towards the early part of the summer.

Interceptor requirements submitted were based on the above concepts. Fighter aircraft for air defense had to be jets if they were to have the 25 percent combat superiority over the bombers which was required for successful scramble and interception - and had to be electronically and otherwise equipped to meet the night and foul-weather challenge expected. Armament on these aircraft had to be such as to give them the highest kill probability possible on a single pass.[15] The above concepts additionally decreed that the system had to be operative 24 hours a day and especially on-guard at night and during the late spring and summer periods.

How the enemy would attempt to enter the system and what tactics he would employ after he had made his initial penetration were final subjects for contemplation in establishing the active air defenses. It was assumed that the enemy would know and take advantage of U. S. radar deficiencies in detecting low-flying aircraft, that he would attempt to enter the system at a low altitude, seek to lose himself in friendly air traffic, and then return to altitude for his bomb-runs. It was also assumed that when he realized that he was detected and identified he would employ jamming techniques to hinder air defense

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15. As in fn 12.

ground and airborne radar functioning.[16]

To increase detection capabilities, a civilian ground observer corps was established and attention given to the development of additional mechanical detection devices.[17] To make up for the lack of adequate identification equipment, stringent peacetime air traffic control procedures were instituted and interceptors dispatched to visually check unidentified aircraft entering the air defense system.[18] Finally, intensive study in methods for combating electronic jamming was made a part of the formal training program for persons assigned to duty with the radar units.

III

In analyzing the discrepancies between the air defense system it founded and the air defense system required to meet the type and scope of air attack anticipated, the Air Force has been quite honest with itself and with the official public. As of the end of 1951, by Air Force admittance, not even a minimum air defense had been reached. Existing air defenses, top Air Force officers averred, could not expect to account for much more than 30 percent of an attacking air armada. These pessimistic appraisals, however, as is abundantly supported by

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16. Bergquist, ADC Com. Conf., Oct 1951. See also: Memo, "Panel Questions on Air Force Problem of 2 March 1950," 10 Mar 1950 (DOC 6).

17. See ch. ii, following.

18. See ch. vi, following.

the official histories, have not deterred those responsible for air defense from concentrating every effort, with resources available, toward minimizing the destruction of an atomic air attack sufficiently to enable an immediate counterthrust by our own atomic bomb carriers and by the remainder of our armed forces.

CHAPTER TWO

DETECTION

I

The three years prior to 1952 were characterized in the radar effort by a dual objective: to make provision for an immediate radar capability, and to plan and build a radar system which would meet the challenge of intercontinental aerial warfare envisaged for the near future.

As was recounted in the preceding volume of the history, the earliest radar plan in the postwar era, plan SUPREMACY, called for an extensive coverage by ground radar of the entire perimeter of the continental United States as well as for an extensive coverage of the hinterland.[1] When this plan aborted, for lack of Congressional funding support, USAF set out, late in 1948, to garner every piece of ground radar equipment which could be manned and to locate that equipment in those areas of the United States considered most important strategically.[2]

This ground radar, withdrawn from storage depots and deployed in what was known as the LASHUP radar system, comprised a motley assortment of equipment, some adequate and some entirely unsuited for

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1. See ADCHR #1, ch. iii.

2. LASHUP deployment is discussed and illustrated in ADCHR #1, ch. iv.

the purpose. Two conflicting considerations dictated the locating of these radars. First was the requirement for siting them where they would provide a maximum of early warning. Second (and a requirement which, in many instances, was contradictory to the requirement of effective tactical deployment) was the necessity of siting them at the least possible cost to the Air Force. The result was that in almost all cases LASHUP radar was located on government-owned land. In some instances, this deployment coincided with efficient tactical disposition of the radar; in other instances it did not.[3] Within these restrictions, LASHUP radars, by mid-1950, had been concentrated in four areas of the country - the Northeast, the Northwest, New Mexico, and California.[4] The deployment and operation of LASHUP, though negligible in providing defense capability, proved of infinite value in serving as a laboratory of air defense tactics, techniques, procedures and organization.

Simultaneously with LASHUP, the attempt to meet the challenge of the future was carried on. From 1949 through 1951 a gigantic program of research and development, production, siting, and construction was implemented toward this end.[5] By the end of 1951, many of

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3. As in fn 2.

4. In the earliest planning, New Mexico was placed ahead of California in order of priority, but in 1950 the situation was reversed.

5. For a full account of the Permanent radar net, see ADCHR #1, ch. v.

the ingredients of the Permanent radar system embarked on in 1949 were on hand and were being welded into an operational network to take the place of LASHUP. The Permanent system called for the construction of 76 radar sites and ten control centers deployed throughout the country so as to give not only an adequate perimeter coverage but also a considerable defense in depth capability.[6] This program was implemented with great determination from the start. By March 1950 construction had begun on the actual sites; by the end of 1951 all sites were in effect completed. Throughout the latter half of 1951 a large percentage of these sites was provided with new radars, and a large percentage of them, as we shall see, had been placed in some degree of operational status. It was estimated that by June 1952 all stations of the new system would be ready for integration into the operational AC&W network.[7]

The gradual emergency of the Permanent stations did not greatly alter the basic pattern of radar coverage commenced under LASHUP. There were modifications of LASHUP deployment, but in general these modifications were minor ones and consisted of an effort to link the northwestern coverage with that of California

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6. See ADCHR #1, ch. v.

7. Of the 76 Permanent radar sites in March 1952, 30 were operating on a limited operational basis. The remainder were in various stages of completion. The program as a whole was several months behind schedule, and it was apparent that a fully operational status for all sites would not take place before the autumn of 1952. [Bergquist, Report of ADC Commanders Conference at Hamilton AFB, March 1952 (hereinafter referred to as ADC Com. Conf., Mar 1952)]

and the northeastern with the northwestern along the important Canadian border area.

Perhaps the most important problem encountered in the phase-over from the LASHUP to the Permanent radar system was that of continuing to maintain a maximum air defense capability during this transition period. During that time the Air Defense Command was placed in a situation not unlike that of a circus tightrope walker. In some instances, even before the new, modern, radar equipment was installed, the operation of the new sites was anticipated by moving in LASHUP personnel and equipment from a neighboring LASHUP site. In other instances, where delivery of equipment and construction were accomplished with speed, these new sites took their places at once in the operational radar net. The result was that by late 1951 and early 1952 radar deployment represented a hodge-podge of components in various stages of operation. Side by side with the remaining LASHUP sites were new Permanent sites and hybrid stations known as LASHUP Permanent (LP) sites. In view of the complexity of this situation, it is little wonder that ADC's various Combat Operations Centers were hard put to keep track of daily developments in the changing picture of radar capability and deployment.

By the end of 1951, the Pacific coastline of the U. S. had been provided with radar coverage. The northeastern U. S., from the Great Lakes to Maine, and from Maine to North Carolina, had also been

provided for. However, an extensive area of the international border between Canada and the United States was very sparsely covered, and, with the exception of the stations in New Mexico, the entire "soft underbelly" of the United States from Arizona to the Carolinas was without early warning coverage.[8] Essentially, therefore, the radar deployment at the end of 1951 had the effect of constituting four separate systems: one in the Northeast, one in California, one in the Northwest, and one in New Mexico. Of these, only the one in the Northeast contained enough radar to constitute any semblance of a defense in depth.

Equipment-wise, the AC&W situation which prevailed at the end of 1951 represented a bewildering assortment of World War II and postwar varieties of radar. The old LASHUP equipment was composed of the following basic search radars: the AN/CPS-1, the AN/CPS-5, the AN/CPS-6, and the AN/TPS-1B. LASHUP sites contained a limited number of height-finding radar of the following two types: the AN/CPS-4 and the AN/TPS-10, the latter being almost universally condemned as unsuitable. Interspersed with this LASHUP radar were some fourteen postwar radars of the AN/CPS-6B type and a very small

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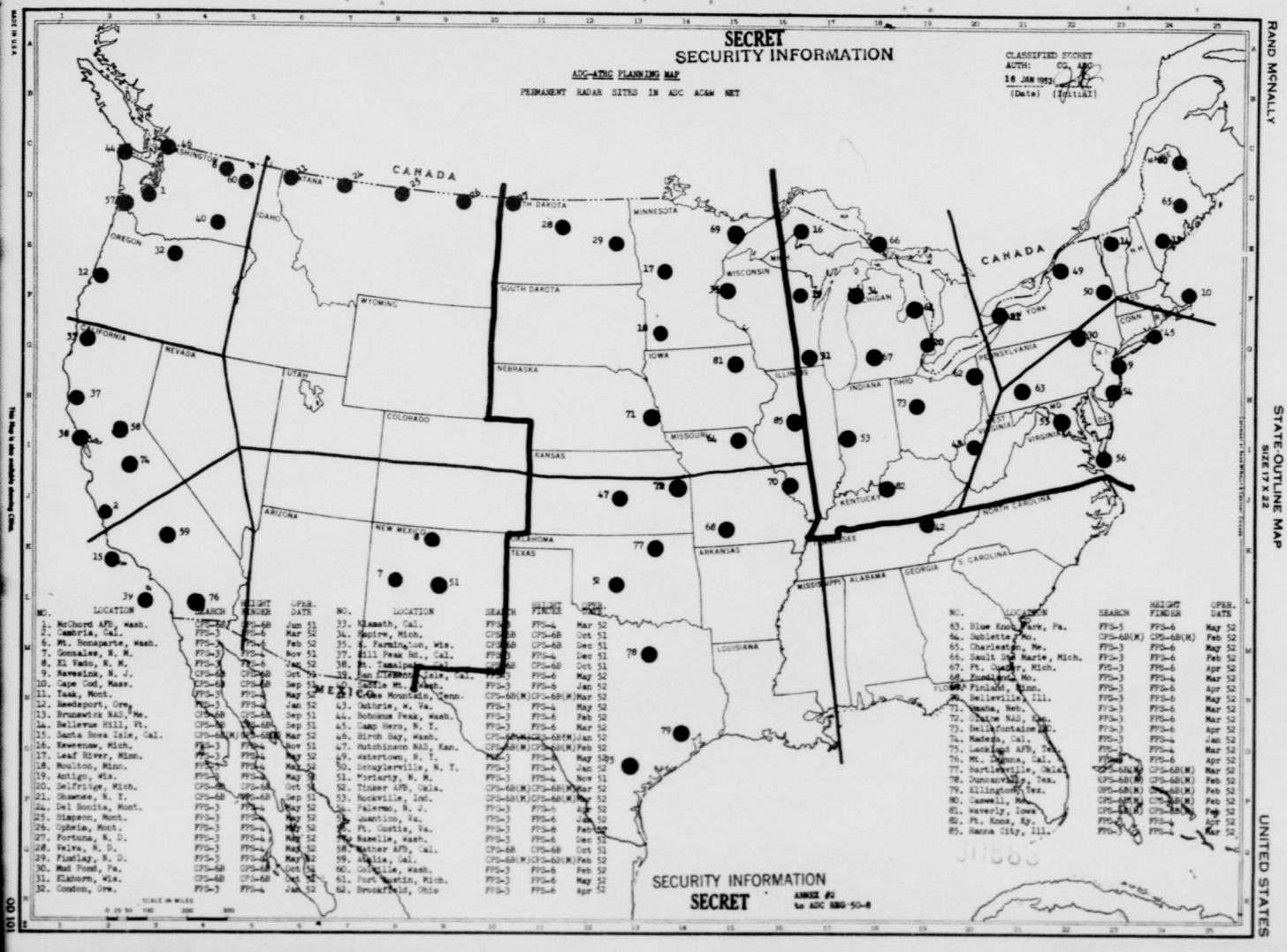
8. The vulnerable section of border in Montana constituted a constant threat in this period to the important Seattle-Hanford area of the Northwest. In March 1952, the Permanent site across Montana were reporting into the radar net using AN/TPS-1B equipment pending arrival of the newer basic search radar.



NO.	LOCATION	SEARCH FINDER	HEIGHT FINDER	OPER. DATE
1.	McChord AFB, Wash.	CPS-6B	CPS-6B	Jun 51
2.	Cambria, Cal.	FPS-3	FPS-6	Mar 52
6.	Mt. Bonaparte, Wash.	FPS-3	FPS-6	Feb 52
7.	Gonzales, N. M.	FPS-3	FPS-4	Nov 51
8.	El Vado, N. M.	FPS-3	FPS-6	Jan 52
9.	Navesink, N. J.	CPS-6B	CPS-6B	Oct 51
10.	Cape Cod, Mass.	CPS-6B	CPS-6B	Sep 51
11.	Task, Mont.	FPS-3	FPS-4	May 52
12.	Needesport, Ore.	FPS-3	FPS-4	Jan 52
13.	Brunswick NAS, Me.	CPS-6B	CPS-6B	Sep 51
14.	Bellevue Hill, Vt.	CPS-6B	CPS-6B	Sep 51
15.	Santa Rosa Isle, Cal.	CPS-6B(M)	CPS-6B(M)	Mar 52
16.	Keweenaw, Mich.	FPS-3	FPS-4	Nov 51
17.	Leaf River, Minn.	FPS-3	FPS-4	May 52
18.	Moulton, Minn.	FPS-3	FPS-4	May 52
19.	Antigo, Wis.	FPS-3	FPS-4	May 52
20.	Selfridge, Mich.	CPS-6B	CPS-6B	Oct 51
21.	Shawnee, N. Y.	CPS-6B	CPS-6B	Sep 51
24.	Del Bonita, Mont.	FPS-3	FPS-4	May 52
25.	Simpson, Mont.	FPS-3	FPS-4	May 52
26.	Ophelia, Mont.	FPS-3	FPS-4	May 52
27.	Fortuna, N. D.	FPS-3	FPS-4	May 52
28.	Velva, N. D.	FPS-3	FPS-4	May 52
29.	Finnley, N. D.	FPS-3	FPS-4	May 52
30.	Mud Pond, Pa.	CPS-6B	CPS-6B	Oct 51
31.	Elsborn, Wis.	CPS-6B	CPS-6B	Oct 51
32.	Condon, Ore.	FPS-3	FPS-4	Jan 52
33.	Klamath, Cal.	FPS-3	FPS-4	Mar 52
34.	Empire, Mich.	CPS-6B	CPS-6B	Oct 51
35.	S. Farmington, Wis.	CPS-6B	CPS-6B	Dec 51
37.	Hill Peak Mt., Cal.	FPS-3	FPS-4	Dec 51
38.	Mt. Tamalpais, Cal.	CPS-6B	CPS-6B	Oct 51
39.	San Clemente Isle, Cal.	FPS-3	FPS-6	May 52
40.	Saddle Mt., Wash.	FPS-3	FPS-6	Jan 52
42.	Oke Mountain, Penn.	CPS-6B(M)	CPS-6B(M)	Mar 52
43.	Ashorie, W. Va.	FPS-3	FPS-4	May 52
44.	Bohokus Peak, Wash.	FPS-3	FPS-4	Feb 52
45.	Camp Hero, N. Y.	FPS-3	FPS-6	Mar 52
46.	Birch Bay, Wash.	CPS-6B(M)	CPS-6B(M)	Jan 52
47.	Hutchinson NAS, Kan.	CPS-6B(M)	CPS-6B(M)	Feb 52
49.	Watertown, N. Y.	FPS-3	FPS-4	May 52
50.	Donaglerville, N. Y.	FPS-3	FPS-4	Jan 52
51.	Moriarty, N. M.	FPS-3	FPS-4	Nov 51
52.	Tinker AFB, Okla.	CPS-6B(M)	CPS-6B(M)	Mar 52
53.	Rockville, Ind.	CPS-6B(M)	CPS-6B(M)	May 52
54.	Palermo, N. J.	FPS-3	FPS-4	Apr 52
55.	Suffolk, Va.	FPS-3	FPS-6	Jan 52
56.	Ft. Custis, Va.	FPS-3	FPS-6	Feb 52
57.	Naselle, Wash.	FPS-3	FPS-6	Dec 51
58.	Mather AFB, Cal.	CPS-6B	CPS-6B	Oct 51
59.	Alalia, Cal.	CPS-6B(M)	CPS-6B(M)	Feb 52
60.	Colville, Wash.	FPS-3	FPS-6	Feb 52
61.	Port Austin, Mich.	FPS-3	FPS-6	May 52
62.	Brookfield, Ohio	FPS-3	FPS-6	Apr 52
63.	Blue Knob, Park, Pa.	FPS-5	FPS-6	May 52
64.	Sublette, Mo.	CPS-6B	CPS-6B(M)	Oct 51
65.	Charleston, Me.	FPS-3	FPS-6	May 52
66.	Sault Ste Marie, Mich.	FPS-3	FPS-6	Feb 52
67.	Ft. Custer, Mich.	FPS-3	FPS-6	Apr 52
68.	Kondiaro, Mo.	FPS-3	FPS-4	Mar 52
69.	Finland, Minn.	FPS-3	FPS-6	Apr 52
70.	Belleville, Ill.	FPS-3	FPS-6	May 52
71.	Omaha, Nebr.	FPS-3	FPS-6	Mar 52
72.	Offutt NAS, Nebr.	FPS-3	FPS-6	Mar 52
73.	Bellefontaine, Ohio	FPS-3	FPS-6	Apr 52
74.	Madera, Cal.	FPS-3	FPS-4	Jan 52
75.	Lockheed AFB, Tex.	FPS-3	FPS-4	Mar 52
76.	Mt. Laguna, Cal.	FPS-3	FPS-6	Apr 52
77.	Bartlesville, Okla.	CPS-6B(M)	CPS-6B(M)	Mar 52
78.	Duncanville, Tex.	CPS-6B(M)	CPS-6B(M)	Feb 52
79.	Ellington, Tex.	CPS-6B(M)	CPS-6B(M)	Feb 52
80.	Caswell, Kan.	CPS-6B(M)	CPS-6B(M)	Feb 52
81.	Waverly, Iowa	CPS-6B(M)	CPS-6B(M)	Feb 52
82.	Ft. Knox, Ky.	FPS-3	FPS-4	Apr 52
85.	Hanna City, Ill.	FPS-3	FPS-4	Mar 52

number of search radars of the AN/FPS-3 variety.[9]

The capabilities of these equipments varied considerably, depending upon a variety of factors which included geography and the inherent limitations of the equipment, as well as problems of maintenance and supply of parts. On the whole, the ground radar equipment may be said to have averaged between 100 and 200 miles in range at an altitude of 30,000 feet. At altitudes below 5,000 feet, however, radar detection capability deteriorated very considerably, oftentimes to as low as 10% of the maximum capability of the sets - an extremely insufficient percentage. As will be told time and again in the history, this failure of radar to detect low-flying aircraft was a major problem in establishing the air defenses.

II

It had been foreseen at the start that the completed Permanent system would be deficient in minimum coverage. Part of the program to plug the gaps in the perimeters and in the defenses in depth included provisions for a number of supplementary or "mobile" stations. By mid-1951 plans had been firmed for the addition of some 44 radar stations of this type, though actual sites had not been established. In this program, a complicating factor was the requirement imposed upon ADC to provide some degree of early-warning and GCI protection for the following SAC installations, on which were based the long-range bombers which played such a vital role in America's

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9. For descriptions of this radar equipment and pertinent bibliographical data see ADCHR #1, chs. iv and v.

military strategy: MacDill, Florida; Barksdale, Louisiana; Walker, New Mexico; Davis-Monthan, Arizona; Biggs, Texas; and Rapid City, South Dakota. It was felt that for adequate early-warning, a small, surrounding ring of at least three early-warning stations had to be placed at each base; the result was that a total of 24 mobile stations were earmarked for the defense of these installations. The remaining twenty were to be deployed both on the perimeter and in the interstices of the Permanent system. Actual locations for these radars, termed "gap-fillers," were only approximately indicated at the end of 1951.

In the program of deployment for the gap-filler radars, the realization of the increasing capability of the enemy to penetrate and to attack targets at low altitudes made it necessary to reconsider the entire planned deployment of these pieces. The rationale behind the programmed deployment and changes in the original mobile radar plan were given by General Bergquist.[10] ADC, the General stated, was convinced that the Soviet initial attack, while primarily directed at industrial, governmental and population centers, would also attempt to partially destroy SAC's retaliatory capability. The decision was made, therefore, to establish areas for air defense, with higher priority on those areas wherein destruction of population, government, and industry would hurt the United States most; any other critical targets outside these primary areas would, of necessity, be afforded

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10. ADC Com. Conf., Mar 1952.

a lesser degree of priority. To make more effective use of the less than adequate forces available, and programmed for the near future, the theory of a double perimeter defense around each of the high priority areas was evolved. An active air defense band of approximately 250 miles in depth was to be established around the target area. The functions of detection, identification, interception and destruction were to be carried out in this band. To attain this capability a double perimeter of prime radars with satellite gap-fillers was to be established. The inner perimeter was to be another 120 miles out. Air traffic corridors with security reporting points were to be established through this band. It was pointed out that defense in depth throughout the target area was not to be sacrificed, but rather that emphasis was to be placed upon the concept of the defense band as the main and initial line of resistance to the enemy.

The revised mobile program was approved by USAF in principle. Essentially, it was to provide reasonable, high-altitude coverage of the most important SAC bases and partial accomplishment of the system of double air defense perimeters around the Northeast, Northwest, and California target areas.[11] Resources to implement this double perimeter concept in its entirety, of course, were lacking at the end of 1951. More radars were needed to complete the planned perimeters. Pressing requirements also existed, as later accounts will reveal, for picket vessels and airborne early warning (AEW) aircraft

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11. As in fn 10.

for the seaward extension of the outer perimeter of the air defenses.

III

Experimentation with passive detection devices was an additional effort toward increasing the detection capability of the Permanent radar network. This equipment worked on the principle of detecting and analyzing (whether enemy or friend) approaching aircraft by the electro-magnetic radiation process. Such equipment had achieved spectacular success during World War II when it was employed by Germany to discover and locate Allied bombing raids. Immediately after the war, the U. S. Navy began extensive research into this field for its own purposes in detecting submarines. Equipment of this nature was also installed by the Air Force in very heavy bombers such as the B-36. In the spring of 1951, USAF determined to test this device in the air defense system and offered twelve of the sets to ADC for experimentation. ADC's experiences with the equipment by the end of 1951 revealed certain shortcomings in it for air defense operations in the form in which it was received.

The most serious problem encountered in the use of this equipment was the fact that the frequency spectrum ranged from 1,000 to 11,000 megacycles and that only a very minor portion of this spectrum was employed by electronic emissions. The receiver had the capability of scanning a range of only ten megacycles at one time and took approximately ten minutes to do this. Because prior knowledge of the wave length characteristics of enemy electronic equipment was

lacking, the process of scanning for any section of such a wide spectrum was time consuming. Furthermore, the set was incapable of determining range by itself, being able to determine the azimuth heading only. In order to determine the range of an attacking aircraft, a process of triangulation was necessary, employing three sets spaced about 150 miles apart.

The potentialities of the set, if properly modified to suit the purpose of air defense, however, were very encouraging. The range of the equipment was approximately one and one-half times the range of assigned search radar, and the device had the potentiality of extending early warning up to a maximum of 30 minutes beyond the radar capability. A research and development project to adapt passive detection equipment to the uses required of it was initiated in 1951 with the requirement that it pick up any radiation upon an "open range" principle, so that scanning a small area of the frequency spectrum at a time would be unnecessary. The modified equipment was expected to be made available to air defense sometime in 1953 or early 1954.

By the start of 1952, twelve of the unmodified passive detection sets had been received by ADC. Four sets apiece were delivered to the 26th, 28th, and 25th Air Divisions. Specific deployment of the sets was programmed for Navesink, N. J., Camp Hero, N. Y., Palermo, N. J., Mt. Tamalpais, Cal., Pt. Arena, Cal., Mather AFB, Cal., Naselle, Wash., McChord AFB, Wash., and Birch Bay, Wash. Three sets were kept in reserve in each division area. An additional set was placed in

operation at Rapid City, S. D., in conjunction with SAC. By the first of the year, only one passive detection set, the one at Navesink, was in an operational status.

At the end of 1951, it was felt that passive detection would eventually assume an important detection role alongside the ground radar in the air defense system. Not only could it extend the range of early warning, but also it was not disturbed by the problem of coverage of low altitudes. In addition, it could pick up a very small radiation from a midget object, which the radar could not do. Before passive detection could come into its destined place, however, the shortcomings mentioned above had to be eliminated. ADC was optimistic about the success of research and development to this end. Although originally it had been planned that 100 such sets would be ordered for air defense, no firm commitment was made on future acquisitions, pending the outcome of development of the equipment.

IV

In view of the assumption that air attack against the continental U. S. would come from the north, an urgent requirement existed for extending the early warning capabilities of the U. S. air defense system into Canada, Alaska, and Greenland. The establishment of effective detection facilities in these areas would serve the two-fold purpose of forcing the potential enemy into circuitous routes of flight and of providing the United States radar net with a defense in-depth capability, especially along the southern borders of Canada.

Although Alaska, by virtue of its proximity to Siberia, was extremely vulnerable to a Russian offensive, the establishment of a radar network there offered incalculable advantages to ADC's continental defense efforts. Simultaneously with the earliest plans to erect an air defense system in the continental United States, a program was launched by USAF to provide Alaska with immediate AC&W resources. The process of development of these facilities was very similar to that experienced in the United States proper. Before a minimum AC&W capability could be established by the construction and installation of a modern AC&W system, a hasty barrier of interim defenses had to be created. This Alaskan interim AC&W system eventually comprised nine radar stations, four of which had GCI capabilities, the remaining five being early warning in function. Two defense areas were created, divided by a line drawn east and west along the 64 degree parallel. The southern area was serviced by the 531st AC&W Group, which had been manned and trained by the old ADC in 1949, with headquarters at Elmendorf Air Force Base. The northern area was controlled by the 532d AC&W Group, with its base at Ladd AFB.[12]

The Permanent radar net planned for Alaska was to supersede the interim deployment mentioned above. This future network envisaged two master GCI stations outfitted with AN/CPS-6B radars, and eight stations employing AN/FPS-3 equipment. Control centers for the

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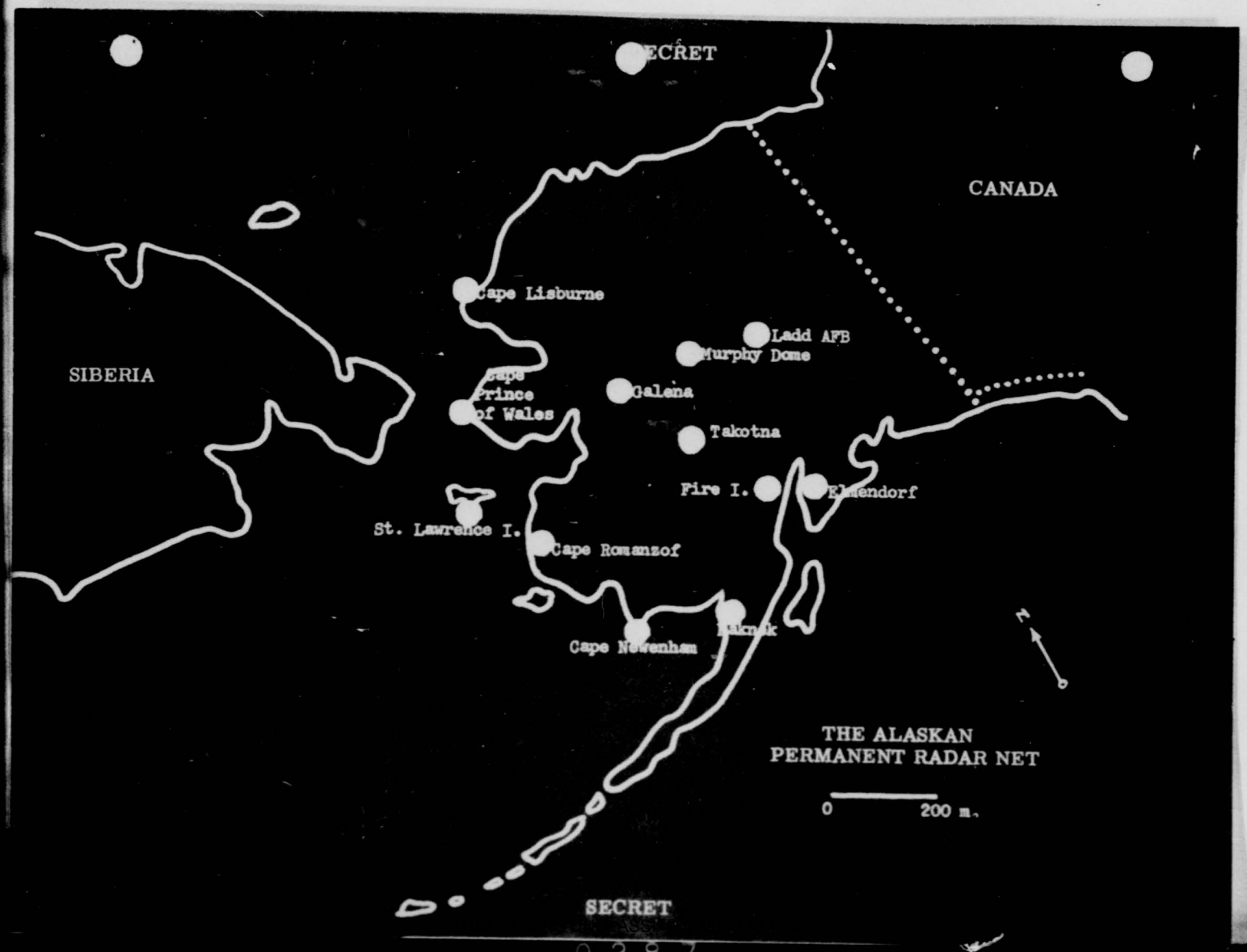
12. ADC to EADF, "Radar Installations in the Aleutians and Alaska," 27 Jul 1951 (DOC 7). Actual deployment of the AC&W resources was as follows: GCI - Naknek, Elmendorf, Clear, Galena; EW - Bethel, Farewell, Kotzebue, Nome, Gambell.



Permanent network were destined to be located at Elmendorf and Ladd Air Force Bases.[13]

A serious problem which arose early in the relations between the Alaskan radar system and the continental United States system was that of adequate communications between the two. In late 1951 there were as yet only four circuits to Alaska, only one of which was controlled by the Alaskan Air Command (AAC). The difficulties of establishing quick and reliable communications between ADC and AAC were revealed by an experience which occurred as late as the fall of 1951 when the Commanding General of Western Air Defense Force (WADF) took three and one-half hours to establish contact with the AAC Commander.[14] Plans to improve the lamentable communications deficiency between the Alaskan and ZI defense networks were consequently accelerated. Requirements called for two voice circuits and one teletype circuit to connect the McChord-Vancouver-Elmendorf AC&W circuits.[15]

The principle of joint Canadian-American defense of the northern half of the Western Hemisphere was laid down as early as 1940, when the Permanent Joint Defense Board was established. The agreement which established the principle of joint defense was reiterated after the end of World War II, and joint planning continued

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13. As in fn 12. Deployment of the radars was as follows: GCI - Fire Island, Murphy Dome; EW - Galena, Takotna, Nakenk, Cape Newenham, Cape Romanzof, St. Lawrence I., Cape Prince of Wales, Cape Lisburne.

14. ADC Com. Conf., 15-16 Oct 1951, pp. 60-61.

15. Agenda for Air Defense Com. Conf., 23-24 Jan 1952.

during the postwar years.[16] A major outcome of this postwar planning was the decision to extend American early warning radar coverage into Canada. By July 1951 a survey of radar sites in Canada had been accomplished by siting teams sent from the Continental Air Command. The two nations agreed that of the 35 sites programmed in this Radar Extension Plan (REP) twelve were to be built by the RCAF and 22 were to be constructed with American funds.

ADC assumed specific responsibilities in the joint radar net. ADC was to man, operate, and give supply and logistical support to eight of the Canadian radar sites. In addition, ADC was also responsible for the organization and training of certain AC&W personnel who were to be transferred to the Northeast Air Command (NEAC) for the purpose of manning ten radar stations included in the radar extension plan. ADC was given the responsibility of calibrating the equipment in the Canadian network as well.[17]

By the end of 1951 ADC had taken steps to activate AC&W squadrons for utilization of the REP sites. EADF was to train five of these units and WADF three. It was planned to activate these units 90 days prior to the beneficial occupancy date of the radar site for which the unit was intended. RCAF had indicated that it would prefer to have these personnel phased into their sites by increments because

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16. For a full account of Canadian-American planning see ADCHR #1, ch. xv.

17. USAF to ADC, "Calibration of Canadian Radar Stations," 14 Aug 1951 (DOC 8).

of the lack of facilities to accomodate the entire unit at the time of beneficial occupancy.[18]

By the end of 1951, only five stations were operational in Canada; all were manned and operated by the RCAF. These few sites had limited capabilities, however, since they were sited on interim locations, utilizing LASHUP equipment brought from the American radar net. Because of the manpower limitations imposed by the Canadian National Defense Budget, this Canadian LASHUP radar system was perforce limited to an eight hour per day capability. This condition did not do much to improve the early warning capability in the critical northeast area of the United States. Only when the Canadian REP network was made fully operational would a substantial early-warning capability exist in this area. In an effort to increase the operational capability of the Canadian LASHUP radar system from eight to 24 hours per day, ADC suggested that its own teams man these sites until the Canadian manpower deficiency had been overcome.[19] In answer to this proposal, the encouraging news was received that action was underway by the RCAF itself to put the five operational Canadian sites on a 24-hour basis during the period March-September 1952.[20]

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18. ADC to EADF, "Activation of AC&W Squadrons for Canadian REP Sites," 8 Dec 1951 (DOC 9). ADC to WADF, "Activation of AC&W Squadrons for Canadian REP Sites," 14 Dec 1951 (DOC 10).

19. ADC to USAF, "Increase in Capability of Canadian LASHUP Radar Sites from 8 Hour to 24 Hour Operation," 4 Jan 1952 (DOC 11).

20. TWX, ADC to USAF, 26 Feb 1952 (DOC 12).

Action having been taken to extend radar defenses along the Canadian border and Alaska, the next logical program was to plug the gaps in the northeastern defenses of the "estern Hemisphere. The areas strategically contiguous to the continental United States in the northeast (including Labrador and Newfoundland) though included in the Canadian radar extension plan, were earmarked at an early date for a separate and self-sufficient radar network, designed to complement those established on the Canadian mainland and in Alaska. On 1 October 1950 the United States Northeast Command was established to integrate administrative and operational control of United States military forces in eastern Canada and in Greenland.[21] The principal component of the Northeast Command was the Northeast Air Command (NEAC), a major USAF command, responsible for the air defenses of the area.[22]

The right to build and operate military bases in Newfoundland was granted the United States in 1940 "free and without compensation" by executive agreement between the United States and Great Britain, whose crown colony Newfoundland was. United States military activity in Greenland began in 1940 with an agreement between the Danish government in exile and the United States. By this agreement, the United States assumed an emergency protectorate of Greenland with the right

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21. Though manned by NEAC personnel, the Greenland stations were not part of the Radar Extension Plan.

22. An event which augured well for the eventual harmonization of the NEAC air defense system with that of ADC was the appointment in March 1952 of ADC's Vice-Commander, Maj. Gen. Charles T. Myers, as Commanding General of the U. S. Northeast Command.

to build and to maintain military bases. Subsequently, agreements with Denmark and Canada (Newfoundland was federated into Canada in 1948) were modified and clarified commensurate with more recent mutual defense requirements. The radar plans for the eastern Canada-Greenland area anticipated a net of ten radar sites and one Air Defense Control Center (ADCC). ADC furnished a team of four officers for the program and it was anticipated that the siting project would be completed early in 1952.[23]

V

The inability of radar to detect (with any degree of validity) aircraft flying at 5,000 feet or lower made the inclusion of a ground observer corps (GOC) in the air defense system a necessity. The decision to create such an organization was the result of a premise that though effective use of a body of civilian volunteers would always be a moot point, such an organization had potentialities which could not be ignored. In the years from 1949 to 1952, a concerted effort was made by ConAC, and later ADC, to implement this decision by the establishment of a GOC operating on a part-time volunteer basis through a network of GOC posts and Filter Centers reporting into the military air defense system. By the end of 1951

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23. 1st Ind., 17 Aug 1951, to EADF to ADC, "Utilization of Air National Guard AC&W Units Ordered into Military Service," 20 Jul 1951 (DOC 13). Toward the end of 1951 informal information indicated that the 152d AC&W Group, which was scheduled for NEAC, would depart sometime in the spring of 1952.

approximately 200,000 civilian volunteers were enrolled in the GOC, operating a total of 49 filter centers and observation posts. It was estimated that a minimum of 500,000 civilian observers manning a total of 20,000 observer posts would be required to supplement the military air defense system.[24]

Not only was the GOC theoretically capable of supplying a low-altitude coverage, but it could also provide a detection capability in the perimeter and interstices of the air defense system where it was impossible to locate radar equipment because of economical or other reasons. It was estimated that for five to ten years from 1951 the only low altitude coverage available to air defenses would be that supplied by the GOC.[25] In addition to this important advantage, the GOC offered other theoretical possibilities. Detection by ground observers was not subject to jamming, nor would such detection aid incoming aircraft by emitting radiations, as in the case of radar. Ground observers could provide more exact information regarding the number and category of enemy aircraft involved. During actual combat, ground observers could provide visual descriptions of enemy tactics, such as the dropping of paratroopers or the presence of gliders in an enemy air force. Lastly, ground observers could

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24. For a history of the GOC up to June 1951 see ADCHR #1, ch. xii.

25. Massachusetts Institute of Technology, Problems of Air Defense: Project CHARLES, 1 Aug 1951, I, 76. (Hereafter referred to as Project CHARLES) An additional solution to the problem of detecting low-flying raids was being sought in the development of small, unmanned radars deployed approximately 30 miles apart with their intelligence remoted to the prime radar sites.

operate in regions, such as mountainous areas, which were not suitable for radar operation.

Theoretical potential was one thing, however, and actual capability another. During the last six months of 1951, criticism from two quarters was directed against the effectiveness of the GOC. Project CHARLES, a comprehensive study of air defense problems, concluded after an intensive survey of the GOC, that:[26]

> Because of the admittedly low effectiveness of the present ground observer organization much doubt has been expressed concerning its ultimate value. The volunteer efforts of some half-million persons are at stake in this question, and there is danger of a wide-spread and lasting destruction of public willingness to support these and other community activities important to our air defense. Therefore it seems urgent that a decision be made either to reduce the observer corps drastically or to take, wholeheartedly, those steps necessary to make it effective.

This criticism from without, so to speak, was paralleled by criticisms from within the Air Defense Command. At the ADC Commanders Conference in mid-October 1951, Major General Frederic H. Smith, Jr., Commanding General of EADF, called the GOC ". . . one of the most important and one of the least effective . . . tools which we have in the air defense system."[27] To increase the capability of the GOC along the perimeter areas of EADF, General Smith proposed that the GOC be manned on a 24-hour basis. The proposal was to erect a perimeter belt of GOC units along the coastal boundaries

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26. As in fn 25.

27. ADC Com. Conf., Oct 1951, p. 18.

and along the Canadian frontier of EADF and about vital individual targets within the Air Defense Force area.

As originally conceived, the GOC was organized on a stand-by status and was to be alerted during a state of emergency or during infrequent maneuver periods. That the GOC operating under such restrictions was of little or no value was revealed when EADF conducted a surprise alert in its area in the fall of 1951. At the end of three hours, only 74% of the organized observer posts in the area had reached an operational status.[28] It was apparent that the GOC would be ineffective unless it were fully operational at the time an enemy attack struck the United States.

The scope of General Smith's proposal was broadened by ADC when it requested USAF to place the GOC on 24-hour operation in certain vulnerable areas of WADF and CADF, in addition to the critical EADF areas.[29] In order to keep communications costs of a 24-hour GOC to a minimum, ADC proposed that observers report only four-engine aircraft where visual sightings were made. During inclement weather or at night, all aural as well as visual detections were to be reported unless it could be determined that the aircraft was other than a four-engine aircraft. Authorization for 24-hour operations would not only increase the detection capability of the air defense system,

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28. EADF to ADC, "Activation of the Ground Observer Corps," 3 Dec 1951 (DOC 14).

29. ADC to USAF, "24-Hour Operation of Ground Observer Corps," 22 Jan 1952 (DOC 15).

but the continuous operation of the GOC in these areas would bring a peak of operational efficiency which could not be attained by sporadic operations during infrequent air defense maneuvers.

To further step up the intrinsic operational efficiency of the GOC system, ADC made an additional request to USAF. Under existing plans of operation, an observer reporting the movement of aircraft would telephone his message to the filter center through normal long distance channels of the telephone company. Unavoidable time delays were encountered in these transmissions since the calls were handled by a number of operators. Project CHARLES had strongly recommended that remedial action be taken to overcome these time delays and had suggested that a test area be established where direct communications between observation posts and filter centers would be utilized.[30] ADC requested that it be permitted to link the White Plains filter center to the surrounding ground observer posts with a private-line network as an experiment.[31] This more direct system of communication would provide definite operational advantages: there would be instantaneous contact between the observer and the filter center, and other observation posts in neighboring areas could be advised of the direction and probable altitude of approaching aircraft.

Plans for a perimeter belt of continuously manned GOC posts around vital target areas, capable of rapid means of communications

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30. Project CHARLES, I, Appendix III, 8-9.

31. ADC to USAF, "Installation of Private-Line Network at White Plains Filter Center," 14 Feb 1952 (DOC 16).

in the form of a private-line network, augured well for the air defense system. Specifically, this system would help to meet the threat of one enemy tactic which was greatly feared by the air defense planners. A low-level penetration by the enemy possessed an excellent possibility of escaping detection. If the hostile aircraft disappeared into the maze of civilian traffic which existed behind the ADIZs (where the correlation of flight plans was not attempted) and appeared suddenly over such inland targets as Pittsburgh, St. Louis, and Hanford, counteraction before damage was done was improbable.[32] A protective layer of GOC units around such inland areas could afford early warning capability to offset such an eventuality.

The considerations which motivated the establishment of the GOC in the United States were also applicable to Canada. The shortcomings of ground radar and the enormous areas to be covered in the extension of air defense to the north motivated the effort to create a civilian ground observer system in the territory of our northern neighbor.[33]

The civilian ground observer program in Canada differed from its American counterpart in certain important respects. The northern reaches of Canada were very sparsely populated and could not support the same widespread system which existed in the United States. There were, however, relatively dense areas bordering the United States in

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32. ADC Com. Conf., Oct 1951, p. 20.

33. See ADCHR #1, chs. xii, xv.

which a GOC along American lines was feasible. Because of these considerations the Canadian civilian volunteer effort underwent two parallel courses. Eventually the Canadian civilian early-warning net consisted of two systems, the Air Warning Service (Long Range) and the Canadian GOC, constituted to provide for the area north of the 55th parallel and south of it, respectively.[34]

The Air Warning Service (Long Range) went into operation in October 1950. It was designed to provide early-warning for the sparsely populated, but extremely important, northern areas. The agencies taking part in this net and which possessed radio outposts in these isolated areas included the Armed Services, the Department of Transport, the Hudson Bay Company, and the Royal Canadian Mounted Police. Private mining interests and other outposts also provided reporting points. For the most part, radio facilities were to be used as means of communication. The reporters were to indicate all four-engine movements in the area to Canadian defense authorities, and arrangements were made to relay pertinent information to the American air defense system. Since it was assumed that only four-engine aircraft could reach the continent from Soviet bases, movements of smaller aircraft were not to be reported. At the end of 1951 action

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34. Areas from which reports were required by the AWS were: Newfoundland and Labrador north of the 50th parallel, British Columbia north of the 53d parallel, and north of the 55th parallel in all other territories. [Memo, Lt. Col. L. R. Larson, Asst Dir. of OCD to Col. J. F. Fletcher, Dir. of Civil Defense, ADC, "Report of Canadian ADC Visit, 8-9 Oct 1951," 16 Oct 1951, (DOC 17)].

was being taken by the RCAF to integrate this system into the Canadian Ground Observer Corps. A long-range plotting board was to be set up in each of the northernmost filter centers of the Canadian GOC to receive and to evaluate reports from these long-range reporting stations and to forward such information to associated Canadian GCI or EW stations, and subsequently to the AC&W network in the United States. Actual implementation of this plan was to occur as soon as the GOC filter centers in Canada were established, and the target date for the completion of the integrated system was set for April 1952.

The other civilian early-warning system in Canada was the GOC proper. Its area of operation was to be in those regions to the south where population was sufficient to support ground observer activities. The Canadian GOC, like its U. S. counterpart, consisted of a network of observer posts and filter centers employing telephones as the primary means of communication. For the most part, reporting techniques and filtering procedures were the same as those used in the United States. To harmonize both systems, a quota of three officers per class at the Filter Center Officers' course at Tyndall AFB, Florida, was allocated to the RCAF.

Early in 1952, the Canadian GOC was still largely in the planning stage, and, because of fund shortages, little implementation of the plans was expected until the spring of that year. Plans called for 24 filter centers covering 26 designated areas. Two officers

and four airmen were to be assigned to each filter center. In addition, one or more GOC coordinators were to be assigned to each province to expedite the task of organizing the GOC.[35] Plans were also made to engineer cross-border overlap circuits between Canadian filter centers and filter centers in the United States.[36]

VI

The elaborate efforts to extend early-warning capability into the northern land areas of the Western Hemisphere could be justified only if the gaps in early-warning were also covered. The most important of these gaps were seaward off the coasts of the United States, where early-warning capabilities were limited to the performance of coastal radars. When the anticipated speed of enemy bombers is considered in contrast to the limited detection range of coastal radars against low-flying targets, the inadequacy of our coastal protection becomes readily apparent. The total average time required for detection, identification, scramble and interception was 49 minutes, and in this time a TU-4 bomber could travel 294 miles. However, the same enemy aircraft flying at <u>low</u> altitudes would not appear on the radar scope until it had come to within approximately 78 miles of the searching radar. When it is recognized that a large number of our most important population and government centers are

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35. As in fn. 34.

36. RCAF ADC to USAF ADC, "Land Line Circuits - GOC," 14 Nov 1951 (DOC 18).

on the coastline of the United States, the discrepancy of non-existent warning facilities to seaward becomes startling. To eliminate this discrepancy, three techniques were determined upon: the use of airborne early-warning aircraft; deployment of radar-equipped picket vessels offshore; and flash reports by merchant vessels and commercial aviation on the seas.

The development of airborne early-warning equipment has a curious history. The idea was born at the MIT radiation laboratory in 1943, and it was emphasized in 1944 as a possible answer to the "Kamikaze" problem. In this early developmental period an Air Force project was created in 1945 with a view toward using AEW for both air defense and ground support purposes. In 1946, however, the Aeronautical Board became aware of possible Navy-Air Force duplication in the AEW field, and it was agreed that since the Navy had nearly two years' advantage in this research effort, the Air Force would use the basic radar developed for AEW and would confine its research to a few special problems.[37] By 1948 the Air Force suspended even this limited research because of the lack of progress and of funds, but with the understanding that the Navy would continue aggressive research in this field. After a test of AEW in the fall of 1949, it was agreed that the equipment be further developed to perform both air defense and anti-submarine missions.[38] Arrangements were also

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37. Memo, Bergquist, 20 Mar 1951 (DOC 19).

38. USAF to ConAC, "Use of Navy Airborne Early Warning in Air Defense Exercises," 30 Dec 1949 (DOC 193 in ADCHR #1).

made to test AEW in the West Coast area for air defense purposes, and it was concluded from the experiment that existing equipment was still unsuitable. Inherent limitations of the Navy APS-20 radar prevented operations over land, and sea return on the scope made operation over water unreliable.[39]

In the meantime ADC had been conducting studies in order to substantiate a firm requirement for the integration of AEW aircraft into the air defense system.[40] EADF and WADF were requested to submit detailed recommendations and comments regarding the type, number, and deployment of AEW equipment within their respective commands. Besides the comments noted above concerning the limitations of the equipment, WADF suggested a maximum of nineteen aircraft for general deployment in the Pacific Northwest.[41] EADF noted a requirement of two 24-hour plane squadrons for the East Coast.[42] As a result of these recommendations, ADC requested USAF to establish

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39. WADF to ConAC, "Use of Navy Airborne Early Warning in Air Defense Exercises," 10 Jul 1950 (DOC 194 in ADCHR #1).

40. As in fn 38.

41. WADF to ADC, "Use of Navy Airborne Early Warning in Air Defense," 27 Mar 1951 (DOC 20).

42. EADF to ADC, "Use of AEW Aircraft to Augment the Air Defense System," 13 Mar 1951 (DOC 21). EADF went on to add: "It is felt that utilization of these aircraft should take place only when advance information indicates attack is imminent; the few numbers and high operating costs precludes their use as a continuous over-water extension of the radar." /EADF to ADC, "Use of Naval Airborne Early Warning Equipment," 7 Mar 1951 (DOC 22)/.

a project to provide ADC with AEW capability.[43] Three aircraft were requested as "workhorses" to iron out operational procedures. As an initial requirement for large-scale operation, ADC requested five squadrons of eight aircraft each.[44]

Because of the lack of actual operational experience or of criteria upon which to base the future deployment of AEW aircraft, ADC suggested that USAF conduct a comprehensive study to further explore the capabilities of AEW.[45] All that was known of the equipment was based upon limited Navy tests and design criteria established by the Lockheed Aircraft Corporation. These early tests indicated that the maximum scan radius of AEW was about 125 miles and that when AEW aircraft were limited to 150 mile patrol radius, the probability of detection was between 80% and 90%. Sea clutter for lack of an effective MTI, and maintenance problems were other revelations.[46]

As a result of ADC's petitions for AEW aircraft, USAF pro-

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43. ADC to USAF, "Requirement for Airborne Early Warning and Control Equipment," 9 Apr 1951 (DOC 195 in ADCHR #1).

44. As in fn 43.

45. ADC to USAF, "Requirement for an Airborne Early Warning and Control Evaluation Study," 27 Nov 1951 (DOC 23). ADC felt that such a study should (a) evaluate the capabilities of AEW, (b) define the position to be occupied by AEW in the air defense system, (c) outline all possible bases for deployment of AEW, (d) indicate tactics to be used, (e) outline the functions of AEW, (f) determine how to get the most out of AEW utilization in conjunction with the Permanent, land-based radar system and future sea-based radar systems.

46. ADC, Memo, "A Plan for the Employment of Airborne Early Warning and Control," 7 Feb 1952 (DOC 24). See also: ADC to USAF, "Development of Airborne Moving Target Indicator Techniques," 17 Jan 1952 (DOC 25).

grammed 56 RC-121s for this purpose. Lockheed Aircraft Corporation, the manufacturers, indicated that the first of these would be delivered to ADC in May 1953, and that by November 1953 the first AEW squadron would be equipped with ten aircraft.[47] Plans for the utilization of the first AEW aircraft called for an initial deployment along the East Coast. An 800-mile barrier was to be manned 24 hours per day and was to be located approximately 250 miles offshore. Eventually a similar deployment was to be provided for the West Coast. These radar barriers would consist of an area scanned by four AEW aircraft orbiting on stations, with a spacing of 150 miles between aircraft. This would provide an extension to the continental radar net from the coastline seaward for approximately 375 miles and would considerably enhance the early-warning capabilities of the air defense system.[48]

A late development in AEW plans was a tendency to think of AEW aircraft as flying GCI stations which could guide interceptors to the enemy as soon as hostile aircraft were sighted. In this connection an interesting suggestion was made by ADC that AEW aircraft be adapted to enable them to carry a fighter on each wing.[49] ADC

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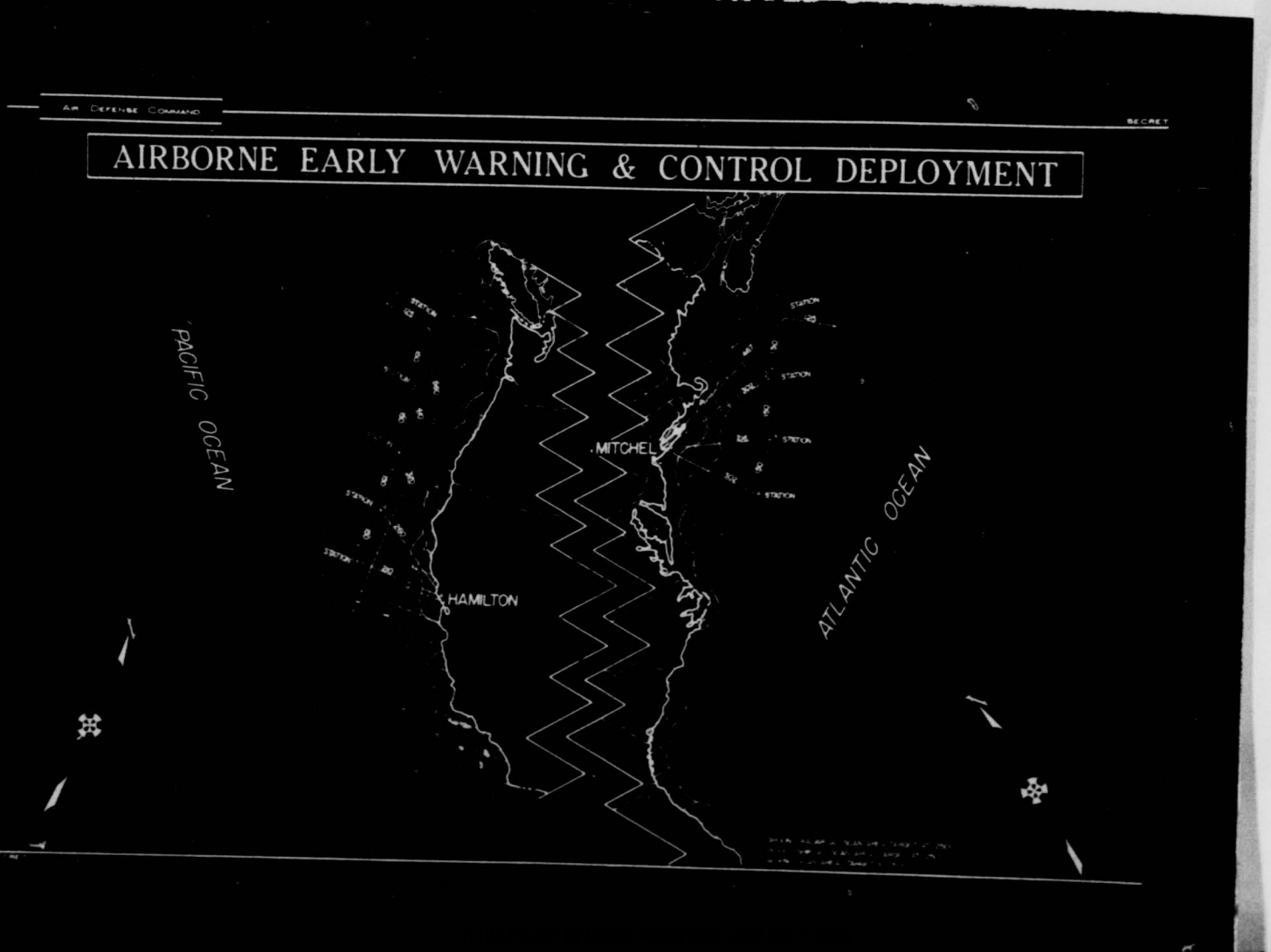
47. As in fn 46. "A Plan for the Employment of AEW&C," 7 Feb 1952.

48. As in fn 46. The East Coast barrier would start at a point 125 miles southeast of Nova Scotia and extend southward to about 250 miles northeast of Norfolk, Va. The West Coast barrier would start at a point 250 miles west of Seattle and extend southward to a point 200 miles west of San Francisco.

49. USAF to ADC, "Air to Air Refueling," 5 Dec 1951 (DOC 26).



also suggested that lighter-than-air aircraft be evaluated for airborne early-warning and control work.[50]

Another method by which early-warning could be increased was through the use of radar-equipped picket vessels stationed offshore. Use of such vessels was seriously considered in the earliest air defense plans, and, after a series of tests had proved they could play an important role in national air defense, it was decided to take positive action to include them.[51] Although in some respects the role of picket vessels duplicated that of Airborne Early Warning, in other respects they were considered unique. An important proposed use of these vessels was as identification points for flights entering the United States from ocean areas. Since fixed locations were proposed for these ships, predetermined check points for overwater flights would relieve the AC&W system of the confusion occasioned by aircraft entering the country at a myriad of unpredictable points along the coast. Picket vessels also would be relatively free of the most important drawback of AEW, namely, sea clutter. However, merits which AEW possessed were: greater area coverage potential and more accurate low-altitude coverage. Operation TUNA, held off the East Coast in 1951, revealed that picket vessels possessed an excellent GCI potentiality, whereas such a use by AEW was still a moot

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50. See 1st Ind., 4 Jan 1952, to USAF to ADC, "Early Warning Relay System," 14 Dec 1951 (DOC 27).

51. Tests in BLACKJACK, WHIPSTOCK and especially TUNA.

point pending further utilization.[52]

On 2 March 1950 USAF placed a requirement with the JCS for ten picket vessels to be stationed as follows: two each off the cities of New York, Philadelphia, Norfolk, San Francisco and Seattle.[53] The request led to a protracted debate with the Navy. The latter's reaction to this proposal was that because of a shortage of naval vessels suitable for the task, provision of the vessels would be most unlikely unless a national emergency warranted their use.[54] The Navy declared themselves willing to supply the vessels on 24-hour notice. ADC's reaction to this was well expressed by the Commanding General of the 26th Air Division, Brigadier General Russell J. Minty: "It is recommended that strenuous efforts be made to strengthen our defense against the initial attack by obtaining radar picket vessels prior to and during the initial attack."[55]

On 22 January 1951 USAF reiterated its requirements to the Chief of Naval Operations for ten picket vessels at the earliest possible date. The Navy reply was that they were doing their best to supply the vessels, but could not fulfill the demand before 1954

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52. TWX, EADF to ADC, 27 Jun 1951 (DOC 28).

53. ADC to USAF, "Radar Picket Vessel Utilization in Air Defense," 13 Dec 1950 (DOC 29).

54. Commander in Chief, U. S. Atlantic Fleet to Commander, Eastern Sea Frontier, "Requirement for Radar Picket Vessels to Supplement the Eastern Air Defense Force Permanent Radar System," 19 Dec 1950 (DOC 30).

55. The History of the 26th Air Division (Defense) 1 Jan - 31 Mar 1951, p. 76.

at the earliest.[56] USAF's reaction, presented in April 1951, was that the proposed 1954 date was entirely inadequate and that mid-1952 was the very latest date possible, commensurate with USAF's air defense obligations. USAF tried again in September 1951, this time asking for sea-based radar coverage of certain offshore areas rather than for pickets in express, fixed locations. This new phraseology was apparently a plea to the Navy's area responsibilities. In reply, the CNO indicated that Navy capabilities were being re-surveyed to meet ADC requirements for area coverage with vessels other than the picket type.[57]

Here matters rested at the end of 1951. The Navy had expressed its willingness to furnish ADC with the required vessels on 24-hour notice, a proposal which was unpalatable to ADC in view of the assumption that an attack would come without warning. By April 1952 no reply had been received as yet with respect to ADC's request for area coverage of our coastal frontiers.

Faced with what appeared to be a deadlock with the Navy on the matter of naval vessels for radar picket duty, ADC indicated an alternative which might be followed. This was an appeal to the Coast Guard or, more drastically, for the use of civilian vessels for radar-picket duty on a contractual basis.[58] Whether such a course were to

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56. USAF to ADC, "Picket Vessels," 29 Oct 1951 (DOC 31).

57. As in fn 56.

58. ADC to USAF, "Radar Picket Vessel Utilization in Air Defense," 27 Nov 1951 (DOC 32).

be taken depended upon the Navy's reaction to ADC's proposals in the immediate future.

In an effort to exhaust every possibility for extending early-warning capabilities, ADC has envisaged the use of merchant marine vessels, military vessels, and commercial and military aviation on overseas flights as "eyes and ears" for sighting enemy aircraft enroute to the United States. As early as July 1950, a system was initiated for receiving reports on aircraft sightings from merchant shipmasters by the Air Defense Forces, in much the same manner as was employed by the Navy to secure submarine sightings.[59] In this early attempt little cooperation was received from the shipmasters, and few, if any, reports were received.

In December 1950 the Air Defense Forces were asked to re-submit their recommendations in an effort to make the flash reporting procedures more efficient.[60] On the basis of the recommendations received, ADC was able to draw up a plan for reporting aircraft sightings off the coast of Canada and off the U. S. coast north of the 32d parallel.[61] The plan outlined action to be taken by merchant vessels, military ships, and commercial and military

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59. ADC to EADF, "Early Air Raid Flash Warnings," 29 Mar 1951 (DOC 33).

60. ConAC to EADF, "Extension of Air Early Warning by Aircraft Flash Reports," 12 Dec 1950 (DOC 34).

61. ADC to USAF, "Extension of Air Early Warning by Ships and Aircraft Flash Reports," 11 May 1951 (DOC 35); see also: USAF to ADC, "Flash Reports of Aircraft Sightings by Shipmasters," 5 Apr 1951 (DOC 35).

aircraft in relaying reports to the air defense system. Specific instructions were to be given to shipmasters and to pilots.[62] By comparing the aircraft sightings with position reports received from friendly aircraft, ADCC and GCI stations could determine whether the aircraft reported were friendly or unknown.

This new plan was presented to USAF for coordination by all interested agencies. It was expected that the Navy, CAA, the Maritime Commission and other agencies concerned would make their recommendations, which would be coordinated into a finished plan by ADC and the Air Defense Forces.[63] At the end of April 1952 no reaction to the plan had been received from USAF.

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62. As in fn 61, Appendices #1 and #2.

63. 1st Ind., 13 Jun 1951 to EADF to ADC, "Aircraft Sightings," 1 Jun 1951 (DOC 36).

CHAPTER THREE

INTERCEPTORS

I

A shortage of jet aircraft equipped for night and all-weather operations, as was told in the previous history, has been one of the major problems in the establishment of the continental air defense system. While there was a steady increase in the number of fighter squadrons assigned the primary mission of air defense in the period from late 1948 to 1951, there was not a commensurate increase in fighter-interceptor capability.[1] True, the increase in squadron strength brought about a numerical increase in fighter aircraft assigned the primary mission of air defense. This increase, for the most part, however, was either in conventional (picton-engine) fighters or in jet fighters not equipped for night and all-weather operations. In late 1950, F-94s were introduced into the air defense fighter-interceptor system, giving it, for the first time, a measure of 24-hour operational capability. Actually, however, the assignment of F-89s in mid-1951 marked the first major advance, equipment-wise, in the fighter-interceptor program in the post-war era. At least, the F-89 was the first air-

1. See ADCHR #1, ch. vii.

craft to be designed and constructed expressly for fighter-interceptor operations.

During the time the air defense system was so sorely in need of them, the Navy possessed considerable aircraft equipped for night and all-weather operations. USAF, naturally, arranged with the Navy for the emergency use of these and other Navy aircraft for air defense. The fact that USAF was not successful in securing from the Joint Chiefs of Staff permission for its air defense agency to assume immediate operational control over all shore-based, Navy aircraft at the time of the initial attack, vitiated, in part, these arrangements. Within these doctrinal confines, however, preparations to employ Navy fighters for emergency air defense have been thorough and intensive. Air defense operational procedures have been issued to Navy and Marine fighters in the form of SOPs and COIs, and Navy and Marine fighter bases have been "wired" into the Air Defense Command's radar warning and control net. Also, Navy and Marine fighters have participated regularly in air defense exercises.

The integration into the air defense system of the fighter resources of the other USAF assigned fighter organizations for emergency employment in the event of enemy air attack was almost completed by the end of 1951. Mutual agreements between the Air Defense Command and the other major Air Force commands possessing fighters for emergency air defense had been concluded, and firm plans were extant for the immediate recall to active duty of the Air

National Guard fighter squadrons at the outset of hostilities. Additionally, detailed deployment plans had been completed for the concentration of these augmentation fighter resources in the most critical target areas. The inherent weakness in these arrangements was the fact that none of these augmentation fighter forces, with the exception of those all-weather fighter aircraft possessed by the Air Training Command, was capable of 24-hour operations. For the most part, these fighters were F-51s and F-47s, obsolescent for air defense purposes. The remainder were F-80s and F-84s, planes which, as was told in the previous History, were lacking in radar and other essential, air defense, interceptor equipment requisites.[2] In the event of a night or foul-weather attack, the crews of these planes would be ordered to attempt interception, but their chances of effectively diminishing the scope of the raid would be extremely limited and their lives grievously endangered.

II

The Air Defense Command's fighter-interceptor force was scheduled to consist of 57 squadrons (equipped to 25 all-weather aircraft per squadron) by 1953. These squadrons were to be deployed

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2. ADCHR #1, pp. 146-147.

over 48 bases.[3] The gradual build-up toward these figures was phased in with the increase of USAF's assigned strength to 126 wings. This force, backed by the fighter resources of the Navy, of the other major Air Force commands, of the Air National Guard, by Army and Navy antiaircraft, and by the retaliatory force of the Strategic Air Command, would be America's ultimate presentation in any debate in the Kremlin on the advisability of launching an air attack on the United States.

Actually, at the close of 1951 ADC could be certain of only one thing with regard to its fighter-interceptor program. To quote General Bergquist: ". . . the situation /was/ going to get worse before it /got/ better."[4] The greatest unknown factor in planning for the scheduled 57-squadron, fighter-interceptor force, other than

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3. It was noted in the previous History that ADC was programmed for 61 squadrons on 52 bases by mid-1953. (See ADCHR #1, p. 137). Reason for the reduction in these plans to 57 squadrons deployed over 48 bases was explained as follows by General Bergquist: ". . . in the program, we are all working on the basis of 138 combat wings in the Air Force and all the budgetary programs will go ahead on that. However, since all that work was started, the program which finally got through the JCS and the Secretary of Defense is 126 Wing Program, not 138. So, when all our calculations and estimates get into Washington, they are going to have to cut it down to the 126 Wing size. For our command, it means instead of being programmed for 61 squadrons we are programmed for 57. We had to make a quick decision the other day - they gave us about an hour to do it - on what four squadrons we would cut out of the 61 squadron program. This is what we told them: We cut out one of the two squadrons scheduled for Palmdale, Palmdale being the substitute for George. We cut out the squadron scheduled for Biggs. We cut out the squadron scheduled for Pinellas or McDill. We cut out one of the two squadrons scheduled for Stewart." /ADC Com. Conf., Oct 1951, p. 73/

4. ADC Com. Conf., Oct 1951, p. 71.

the omnipresent specters of production and procurement lags, was the extent of future requirements for supporting the Korean action. Since the initial formulation of plans for the build-up of the continental fighter-interceptor force, Korean War needs had resulted in the deferment of ADC re-equipment schedules and had even reduced ADC's already assigned fighter strength. So long as the war in Korea continued, and so long as the threat of war in other sectors of the world existed, it would be necessary to allocate the overseas Air Forces the highest priority for jet fighters. ADC was reconciled to this harsh reality and convinced of the logic of this strategy; however, it was not reluctant in pointing out to higher headquarters the hopelessness of defending the nation in the face of such tremendous interceptor shortages.

At the end of December 1951 there were 41 fighter-interceptor squadrons assigned the Air Defense Command, three less than in the previous June.[5] These units, as the following map attests, were deployed over 38 bases and primarily along the periphery of the nation. By April or June 1952, this assigned strength would further diminish to 37 squadrons; at least, that was the bleak outlook at the

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5. In August 1951 the 81st Fighter-Interceptor Wing, composed of the 91st, 92d, and the 116th Fighter-Interceptor Squadrons, was reassigned from Larson AFB, Washington to Manston, England on Project FA-9. [AMC Operations Order 7-51, 27 Jul 51] See ADC General Orders #64 (DOC 37). This subject is covered in greater detail in History of WADF, Jun-Dec 1951.

end of the year.[6] ADC's immediate problem, therefore, was whether to spread elements of the remaining squadrons over a large area or to maintain their squadron integrity; ADC could very well place small detachments on many bases and, in that manner, attempt to afford a measure of protection to every strategic target in the nation, but that would practically destroy the ability of the fighter-interceptor force to cope with a saturation operation. It appeared, at the end of 1951, that the decision would be to stick to the policy of deploying units by squadrons to the most strategic areas and to assume the risk that these, and not the less strategic and weakly defended areas, would be the first areas attacked.[7]

The long and the short of ADC's predicament was that it was faced, like David, with having to combat a giant with a pebble. Under these circumstances, the only course of action was to train and maintain the limited fighter-interceptor potential to the highest pitch of operational efficiency and to concentrate this force where the strategists believed the attack would be delivered.

On paper, ADC was authorized 1,025 all-weather aircraft for its 41 squadrons. In actuality, it had on hand 687 aircraft of all

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6. In the event ADC lost these squadrons, the bases which would be vacated were to be as follows: Sioux City, Scott, Grandview, and Langley. [As in fn 4, p.75]

7. The areas to be defended were placed in the following priority: No. 1, the Northeast; No. 2, the Northwest; No. 3, the San Francisco-San Diego area; No. 4, the New Mexico-Kirtland area. [As in fn 4, p. 75]

types at the end of 1951, or approximately 67% of its authorized total. Of this number, approximately 27% were all-weather jet aircraft, 36% were day jet fighters, and the remainder were conventional aircraft. In overall aircraft strength, ADC was short 103 at the end of December in comparison with June 1951 figures.[8] The following chart depicts the types and numbers of aircraft on hand and combat ready during the last six months of 1951.[9]

	Jul OH/CR	Aug OH/CR	Sep OH/CR	Oct OH/CR	Nov OH/CR	Dec OH/CR
F-47	93/76	96/69	89/65	85/62	78/59	70/54
F-51	198/148	191/155	192/155	199/174	193/153	195/151
F-82	9/5	5/2	4/2	3/3	3/2	4/1
F-80	39/20	33/23	29/23	31/17	35/24	37/22
F-84	91/46	87/63	69/51	59/42	47/35	38/27
F-86	225/146	161/131	168/141	160/134	141/104	174/123
F-86D	0/0	0/0	0/0	0/0	0/0	0/0
F-89	10/3	12/9	22/8	20/7	21/10	25/0
F-94	80/45	79/56	98/63	137/92	149/102	144/93
TOTAL	745/489	664/508	671/508	694/531	667/489	687/471

One reason for the decline in aircraft strength was a levy, imposed in November, for re-assigning 75 F-86Es from ADC to FEAF.[10] The effect of this order on the combat potential of the air defense system is not difficult of analysis. The F-86E is the finest day

8. ADCHR #1, p. 163.

9. Figures taken from ADC Command Data Book, published by the Directorate of Management Analysis, Hq, ADC, for the months Jul-Dec 1951. See the following for definitions: ADCR 55-2, "Awarding of Combat Crew SSN's and Determining Combat Readiness of Crews and Aircraft," 21 Feb 1952 (DOC 38).

10. ADC Command Data Book, 30 Nov 1951.

jet interceptor yet developed; for the system to lose a three-squadron supply of them in the face of an already serious shortage of combat qualified aircraft was a blow of the first magnitude. The necessity for reassigning these aircraft was at once attributable to the inability of production to keep pace with combat requirements: the F-86E had to be obtained from somewhere to meet the critical requirement of maintaining air supremacy in Korea, and ADC happened to be the only source for them. Perhaps history will prove that application of the "butter and guns" philosophy to production in post World War II America was best for the long-range economic stability of the country; however, the lowering of one critical military requirement to meet another, as exemplified by the reassignment of the F-86Es during this period, must ever remain a calculated risk of the highest order.

Modification and repair requirements and transfers of aircraft to the Air Training Command for use in pilot training also served to lower ADC's assigned fighter strength during the last half of 1951.[11] The chart on the following page indicates how the individual fighter-interceptor squadrons fared, aircraft-wise, at the end of 1951 in comparison with the 25 all-weather aircraft per squadron requirement.

The one bright vista on the fighter-interceptor horizon was

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11. See ADC to AMC, "Excessive Aircraft Time in Depots," 13 Oct 1951, and 1st Ind., AMC to ADC, 7 Dec 1951 (DOC 39). See also: EADF to ADC, "Non-Availability of Tactical Aircraft," 24 Sep 1951, and 1st Ind., ADC to EADF, 16 Oct 1951 (DOC 40).

ADC Interceptor Programs: Present and Scheduled

(As of 21 Dec 51)*

Squadron	Present Station	Permanent Station	Type A/C Assigned	No. A/C Assigned	Interim Conversion	Ultimate Conversion
123d	Portland		F-51D	23	F-86E	F-89D
317th	McChord		F-94A	12		F-94C
318th	McChord	Moline (May 52)	F-94A	12		F-94C
319th	Larson		F-94A	11	F-94C	F-94C
99th	Hamilton	Larson (Sep 52)	F-94C	26	F-94B	F-94C
83d	Hamilton	Travis (Sep 52)	F-89B	11	F-86D	F-86D
84th	Hamilton		F-89B	13		F-89D
94th	Geiger		F-86A	19		F-86D
93d	Kirtland		F-86A	21		F-86D
188th	Long Beach	Oxnard (Jun 52)	F-51D	24	F-89B	F-89B
113th	Scott		F-51H	20	F-86A	F-86D
163d	Baer	Sioux City (Feb 52)	F-51D	21		F-89D
166th	Lockbourne	Youngstown (Jul 52)	F-94C	28	F-89C	F-89C
109th	Wold-Chamberlain		F-51D	26	F-86E	F-89D
175th	Rapid City		F-51D	21	F-86E	F-89D
179th	Duluth		F-51D	20	F-89D	F-89D
120th	Truax		F-80A	20	F-86D	F-86D
176th	Truax		F-51D	21	F-89C	F-89C
61st	Selfridge		F-94B	13		F-86D
62d	Oscoda		F-86A	20	F-94C	F-94C
172d	Selfridge	Phoenix	F-51D	23	F-86E	F-89D
68th	Ware		F-86A	20	F-86D	F-86D
56th	Wright-Patterson		F-86A	20	F-86D	F-86D
2d	McGuire		F-94A	13		F-86D
4th	McGuire		F-94A	12		F-94C
118th	Nashville	McGhee-Tyson (Aug 52)	F-47D	25	F-86E	F-94C
137th	Dow	Loring (May 52)	F-80C	16	F-86A	F-86D
133d	Grenier	Pease	F-47D	22	F-86D	F-86D
136th	Niagara		F-47D	28	F-94B	F-94C
74th	Presque Isle		F-94A	16	F-89C	F-89D
75th	Presque Isle	Truax (Nov 52)	F-86A	15	F-86D	F-86D
134th	Burlington		F-51D	21	F-86D	F-86D
58th	Otis		F-94A	20		F-94C
59th	Otis		F-94B	14		F-94C
60th	Westover		F-86E	20	F-86D	F-86D
118th	Suffolk		F-47N	26	F-86D	F-86D
27th	Griffiss		F-86A	20		F-89D
71st	Gtr Pittsburgh		F-86A	20	F-86D	F-86D
142d	Newcastle		F-94B	13	o/s	F-86D
141st	Andrews		F-94B	13	o/s	F-86D
148th	Dover		F-94B	13	o/s	F-86D

*Source: Air Defense Fighter Interceptor Program.

the increase in radar-equipped jet fighters which occurred during the last half of 1951. In mid-year, eight squadrons possessed radar-equipped jet aircraft; by the end of the year, twelve squadrons were equipped with them. This increase in night and all-weather interceptor capability offset somewhat the loss of the F-86Es to FEAF, the transfer of the three fighter squadrons from the Northwest, and the other aircraft losses which took place during the year. At the same time, continued shortages of jet engines, and continued lack of important radar and armament equipment reduced in part the combat capabilities of the night and all-weather squadrons.

As a result of the loss of so many day jet fighters during the last half of 1951, ADC found it necessary to revise its conversion schedules. It was decided that units scheduled to convert from conventional fighters to day jet fighters (in the interim prior to the equipping of all fighter-interceptor squadrons with radar-equipped jet fighters) would have to retain their obsolescent, conventional aircraft until those day jet squadrons which had lost aircraft to the Korean levy could build back up to authorized strength. Once sufficient aircraft were procured to meet this need, work would commence again to re-equip the conventional squadrons with day jet fighters.[12]

Of ADC's eventual 57 squadrons, thirteen will be equipped with F-89s, eleven with F-94s, and 33 with the single-place, radar-

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12. As in fn 4, p. 72.

equipped, jet fighter, the F-86D.[13] Allocation of these aircraft will be determined to a great extent by their combat characteristics; the F-89s, for example, will be deployed on the perimeter of the defense system for long-range area interception; the F-86Ds will be located where they can perform point-defense of specific targets; the F-94s will then be assigned where they can conduct both area and point-defense interception.[14] Insofar as the limited numbers of these aircraft assigned the air defense system at the end of 1951 permitted, conversion and deployment statistics reflected these intentions.

III

The drain on ADC's trained interceptor crews for overseas and other permanent change of station commitments was another factor which contributed to the general lowering of the combat capability of the interceptor force during the last half of 1951. While there was an increase in the numbers of returned Korean combat pilots and graduates of the Training Command's all-weather schools assigned to ADC, this increase failed to match the loss of combat-ready crews from the system. Not only was the immediate outlook for ADC's attaining its authorized 1.5 pilots per conventional and day fighter

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13. ADC Fighter-Interceptor Program Chart, 1 Jan 1952, published by the Directorate of Plans and Requirements, Hq ADC, on a monthly basis. See chart following p. 52.

14. As in fn 4, pp. 79-80. See DOC 41 for an account of the combat characteristics of the aircraft assigned ADC.

aircraft and two crews per all-weather aircraft a bleak one at the end of the year, but ADC's manning schedule for its programmed 1953 interceptor force appeared destined for failure.[15]

The following table indicates the number of pilots available to the interceptor squadrons and the percentage of these pilots who were combat-ready during the last six months of 1951:[16]

	Jul OH/CR	Aug OH/CR	Sep OH/CR	Oct OH/CR	Nov OH/CR	Dec OH/CR
F-47	80/67	78/59	74/57	83/50	93/68	78/60
F-51	220/182	194/155	219/167	227/175	231/203	217/169
F-82	6/5	5/5	4/4	5/5	5/5	5/5
F-80	37/32	33/23	40/36	38/30	37/27	39/33
F-84	140/103	118/98	125/107	94/81	79/70	46/26
F-86	300/217	213/158	227/170	206/120	230/147	216/90
F-86D	0/0	0/0	0/0	0/0	0/0	0/0
F-89	7/0	9/6	11/9	10/8	12/10	14/0
F-94	70/51	80/56	74/60	94/67	100/82	112/78
TOTAL	860/657	730/560	774/610	757/536	787/612	727/461

15. The policy of giving priority "only to those officers who are on indefinite active duty status" for training at the ATRC jet all-weather school was promulgated during this period. Reason for this policy was very evident: "An all-weather pilot training rate which will not meet our requirements for several years and the high cost of the effort expended in training, make the realization of maximum benefit mandatory." /Chidlaw to Thatcher, and other Air Defense Force Commanders, 27 Nov 1951 (DOC 42)/ See also: ADC to WADF, "Status of Aircrews," 20 Sep 1951 (DOC 43).

16. Figures taken from ADC Command Data Books for Jul-Dec 1951. The regression in combat-ready figures for December was attributable to the new criteria for determining combat-ready crews established in ADCR 55-2 which became effective 15 December. The changed criteria required gunnery qualification in U/E aircraft and presented a more realistic basis for month to month comparison of gains and losses. Under previous yardsticks, a pilot in an F-86 unit who was an expert gunner in the F-86 could be replaced by a pilot who had never fired the F-86 and no change in the combat-ready status of the unit would be reflected.

Although the percentage of the on-hand crews who were combat-ready appeared to be satisfactory, the above figures do not list crews that were assigned but who were on temporary duty, on leave, or enroute to join their units. The inclusion of these crews reduced the combat-ready percentages to an unsatisfactory level. Individual squadron statistics often revealed that while the combat-ready proportion of the on-hand crews was satisfactory, the actual number of combat-ready crews available to fulfill the alert commitments was extremely low.[17] Resolution of ADC's crew problems depended upon the Training Command's ability to increase the output of its

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17. The following is a paraphrased account of the analysis of the Hqs ADC Current Planning Activities Committee of the crew situation: On 31 December 1951 ADC had a total of 178 all-weather crews assigned toward a requirement of 348 crews, based on two crews per assigned aircraft. Had ADC all its authorized all-weather aircraft its crew requirement as of that date would have been 615. According to all available information relevant to the Training Command's crew output, ADC would have far less than the number of all-weather crews actually required to man the assigned aircraft and far less crews to man the authorized aircraft. It was planned that beginning about 1 July 1952 the total input into the Training Command all-weather school would be single engine pilot graduates. This plan would do much in the way of furnishing the required all-weather crews. In addition, beginning on or about 1 April 1952, ADC was scheduled to receive between 30 and 50 night intruder B-26 overseas returnee pilots toward bringing its assigned crew strength to the number actually required. In brief, ADC expected to have 676 all-weather crews assigned as of 1 July 1952 and an actual requirement, based on two crews per all-weather aircraft assigned, of 1,010 all-weather crews. On 1 July 1952, therefore, ADC would be only slightly better off, as far as all-weather crews were concerned, than it was at the end of December 1951. /ADC Current Planning Activities Report, 10 Jan 1952/ For a definition of combat-ready crews see ADCR 55-2, 21 Feb 1952 (DOC 38).

all-weather schools[18] and upon a lessening of overseas reassignment requirements. USAF indicated its willingness to help whenever possible but held out little help for any immediate alteration of the situation present at the close of the year.[19]

IV

The foregoing account should be reasonable explanation of why, in the event of an unheralded enemy air attack, the Air Defense Command will require maximum assistance from all other continental military agencies possessing fighter aircraft. Without this augmentation, so to speak, of the assigned fighter-interceptor force, the

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18. Colonel Ruben Kyle, Hqs ADC Deputy for Personnel, reported as follows at the ADC Commanders Conference of October 1951: ". . . talked to General McNaughton, VC ATRC, and General Vaughn, CG ATRC, on the pilot situation, as well as on training and gunnery. We have been expecting a great deal of help from the Training Command very quickly. However, after talking to both General Vaughn and General McNaughton, I learned that help from the Training Command will be in the far-distant future. The reason for this is that they have had runway trouble at their fields, that they expect to utilize in their Aircrew Training Program . . . In addition, they are short of instructors. I had sincerely hoped that we had hit the bottom on our aircrew problem and were ready to start up again. However, from what General Vaughn tells us, our blackest hour has not yet arrived." [As in fn 4, p. 101]

19. ADC's crew manning status and problems were succinctly summed up in the following exchange of correspondence: ADC to USAF, "Air Defense Command Fighter Pilot Manning Status," 26 Jul 1951, and Inds. (DOC 44); ADC to EADF, "Fighter-Interceptor Pilot Training Program," 6 Jul 1951 (DOC 45); ADC to WADF, "Status of Aircrews," 20 Sep 1951 (DOC 43). For an overall account of USAF's fighter crew predicament see personal letter from Maj. Gen. John H. McCormick, Director of Military Personnel, Hqs USAF, to Col. Reuben Kyle, Jr., DC/S Personnel, Hqs ADC, 24 Jan 1952.

combat potential of the air defense system would be drastically inadequate.

A major source of such support would be the Navy. In the previous work, the background to USAF-Navy relations concerning use of Navy and Marine fighters based within the continental environs of the nation for emergency air defense was sketched in some detail.[20] First concrete progress in this joining of hands for defense was made at Key West in early 1948. Following this meeting, the Chief of Naval Operations pledged the emergency allocation of Navy and Marine resources for air defense providing these forces were not required for Navy operations elsewhere at the time of attack. While USAF's air defense agency was not satisfied with the "providing they were not required elsewhere" proviso in these contracts, it was possible for the Air Defense Forces and their corresponding Sea Frontiers to come to terms and, by mid-1950, to commence actual training of Navy and Marine fighter units for an emergency air defense role. By early 1951, Navy-Air Defense Command training programs had reached a high peak of effectiveness, as the following appraisal by General Thatcher attests:[21]

> These agreements are working out quite well in actual practice both in Eastern and Western. Navy fighter units contribute substantially to our maneuvers and exercises, and cooperation at all echelons is very promising.

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20. ADCHR #1, pp. 237-250.

21. Thatcher, Hq ADC, Deputy for Operations, to Crabb, Hq FEAF, Deputy for Operations, 25 Apr 1951 (DOC 46). See also: ADC to EADF, "Air Defense Doctrine," 8 May 1951, and 1st Ind., EADF to ADC, 9 Jun 1951 (DOC 47).

By October 1950 the Air Defense Forces were receiving from the Navy monthly reports on the number, type and location of Navy shore-based fighters. Scramble lines to many of the Navy fighter bases had been installed by that time and work in this direction placed on a continuing basis.[22] This activity, however, did not assure that these forces would be available for air defense at the outset of hostilities. As General Rush, Commander of the Western Air Defense Force, stated in June 1950: WADF could not ". . . assume that in an emergency any Naval or Marine force [would] remain under [WADF's] control for any extended period . . ." Navy deployment plans were in a condition of flux and overseas deployment of Navy fighter units a great possibility at any time. So while the Air Defense Command could keep close tab on the Navy fighter resources available at a particular time, it could not be certain that these units would not have to be committed to action other than air defense at the time of the initial onslaught.[23]

In April 1950, a study of the average number and types of Navy and Marine fighter aircraft, both Regular and Reserve, which would be home-based at the time of the initial attack, was conducted by ConAC. It is presumed that the findings of this study remain

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22. ConAC to USAF, "Present U. S. Navy Air Defense Availability," 9 Oct 1950 (DOC 48). See also: WADF to COMWSF, "Emergency Integration of Naval and Marine Air Defense Capabilities," 6 Jul 1950 (DOC 49).

23. 1st Ind., to ConAC to WADF, "Use of Naval Aircraft in Air Defense," 20 Jun 1950 (DOC 50).

reasonably accurate. According to this survey, there was a total of 120 Navy fighter squadrons of an equivalent strength of sixteen to twenty aircraft in the Zone of the Interior at all times. The greatest number of these units was located at bases near the seacoasts of the United States. The reason for this, of course, was that when carriers put into port their fighter aircraft were transferred to shore bases.[24]

The length of time for Navy and Marine fighters to scramble for emergency air defense operations is another variable figure. The Navy has stated that all its combat-operational fighters could be put into the air in about four hours. Should the attack occur during normal duty hours, Navy fighters could probably be committed sooner than this; should it come on a weekend or during off-duty hours, it might take considerably longer than four hours to marshall these resources.

Of the Navy fighter potential it can be said, by way of summarization, that the training of these units in air defense operational procedures and the establishment of communications with Navy bases for the radar control of Navy fighters in emergency air defense operations had become an integral part of the air defense scene by the end of 1951. While ADC had no control over the locating

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24. Memo, Col. C. R. Bond, Chief, Air Defense Plans Branch, Hq., ConAC to Thatcher, Deputy for Operations, Hq., ConAC, "Potential Navy Air Defense Capabilities," 10 Apr 1950 (DOC 51). For a general picture of the location of Navy and Marine fighter bases see the Corps of Engineers Map, "Major Army, Navy and Air Force Installations", Dec 1950.

of these units and was unable to present them with emergency deployment orders, they were, for the most part, located in areas where, in the event of emergency, they could be put to good use.[25]

V

Plans for the utilization of the fighter forces of the other major Air Force commands for emergency air defense operations commenced as far back as mid-1948. At that time, the fighters possessed by SAC and TAC were assigned the secondary mission of air defense, and the Air Defense Command was directed to supervise the training of these units in the techniques of fighter-interceptor operations.[26] It was not until early 1951, however, that mutual agreements were consummated between ADC and SAC, and ADC and TAC, for the placement of the fighters of those two commands under the operational control of ADC for emergency air defense.[27] In the last half of 1951, similar agreements were negotiated with those other major commands which possessed fighter resources.

It is conceivable that the fighter forces of the other

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25. See the following for an account of the integration of Naval officers, on TDY, into the air defense system: ADC to USAF, "Assignment of Naval Officers to Elements of the Air Defense Command," 16 Aug 1952 (DOC 76).

26. USAF to ADC, "Joint Training in Air Defense," 8 Jul 1948 (DOC 52).

27. USAF to Major Air Force Commands, "Possible Employment of Forces in the Tactical Air Command and the Strategic Air Command in the Air Defense of the United States," 21 Feb 1951.

major Air Force commands will have to commence operations in accordance with their primary missions immediately upon the outbreak of hostilities. However, this is unlikely if, as present assumptions hold, the enemy attacks without warning; in such an event, air defense will automatically become the primary mission of these units regardless of their basic assignments. ADC expressed the logic of this concept as follows:[28]

> It is recognized that the possibility exists that [the] fighter units of [the other commands] will not be available for air defense in the ZI in the event of hostilities. However, the possibility also exists that these units will be available for a limited time . . . . The possibility of [these] units assisting in air defense of this country even for just a few days after the outbreak of hostilities might well be the deciding factor in survival of the nation.

ADC made it clear to the other major commands that plans to use the latter's fighters for emergency air defense were not intended to interfere with the strategic mission for which these units were basically organized.[29]

The mutual agreement with SAC for use of that command's fighter squadrons in emergency air defense was consummated in April 1951.[30] Late in the year, detailed plans were formulated for the emergency employment of SAC fighters in air defense, both from their

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28. TWX, ADC to SAC, 11 Dec 1951 (DOC 53).

29. As in fn 28.

30. ADC and SAC, "Mutual Agreement for the Air Defense of the United States," 26 Mar 1951 (DOC 54).

home bases and from emergency bases to which they would be deployed, time permitting, at the outset of hostilities. For its part in these negotiations,[31] ADC stated that it would

> . . . lend maximum assistance in providing GCI training for SAC fighter units even though their present deployment plans preclude their planned use in support of [ADC's] mission. For the SAC fighter units presently scheduled for immediate deployment, a station will be prepared by each Defense Force for possible utilization of the units within that area of responsibility in event of emergency and/or change in SAC deployment plans.

Bases to which SAC fighters would be deployed in an emergency were enumerated in ADC operations plans.[32] From these bases they could contribute to the air defense of the nation much better than would be possible from their home stations. The types of aircraft assigned to SAC units, as of the end of 1951, were F-51s and

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31. ADC to SAC, "Utilization of Strategic Air Command Forces in Air Defense of Continental United States," 14 Aug 1951 (DOC 55).

32. See Hqs ADC Operations Plan 14-51, 1 Dec 1951, Annex A, "Deployment of Augmentation Forces," (Supplementary Appendix, DOC S-1). This Operations Plan was the first of a continuing series to be published monthly by Hq, Air Defense Command. Purpose of these plans was two-fold, as explained by Col. C. W. McColpin in an IRS to the Vice Commander, Hqs ADC, on 6 Dec 1951: "To provide instructions to the Air Defense Forces to carry out planned operations for a particular month, and to provide other commands listed in task organization with the concept of ADC operations. These operating instructions will outline minimum forces to be allocated to the Air Defense mission, will announce necessary training to be accomplished, and will be used to disseminate operational policies and procedures of the Command. In general, this plan will provide basis for action that will more closely integrate and standardize the efforts of the Air Defense Forces and strengthen the Air Defense System. To establish a plan for emergency employment of available forces and facilities of other major commands having an air defense capability, which in the event of hostilities would provide a desirable augmentation of ADC forces."

F-84s. Concerning the prospect of these units being better equipped in the near future for an air defense role, SAC could only state that ". . . the equipping program for SAC fighter units /had/ been delayed approximately three to four months due to lack of delivery of new aircraft."[33]

A mutual agreement with TAC for use of that command's fighter forces for emergency air defense also was completed in early 1951.[34] As with SAC, detailed arrangements for the emergency deployment of TAC's fighters were completed in the last half of 1951 and disseminated in pertinent Operations Orders.[35] The map on the following page indicates the scope and intent of these deployment plans.

At the close of 1951 ADC was negotiating with TAC officials for the placement of TAC fighters on daylight alert. It was proposed that, when available, two or more TAC fighters at each TAC station maintain the same alert during VFR daylight hours as the ADC fighter-interceptor units. This arrangement would afford an opportunity for GCI training of TAC fighter-bomber crews, it was figured, and, at the same time, provide a considerable increase in ADC's capability against

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33. As in fn 31, 1st Ind., SAC to ADC (DOC 55).

34. ADC and TAC, "Mutual Agreement for the Air Defense of the Continental United States," Mar 1951 (DOC 56). See also: EADF to ADC, "Cross Training of Tactical Air Command Crews for Utilization in Active Air Defense," 27 Jun 1951, and 1st Ind., ADC to EADF, 18 Jul 1951 (DOC 57).

35. As in fn 32. For background on the discussion and planning which went into the attainment of these arrangements see EADF to ADC, "Utilization of TAC Forces in Emergencies," 17 Jul 1951 (DOC 58).

TAC FORCES FOR AIR DEFENSE AND [illegible]

surprise attack.[36] If TAC approved of such procedures, the Air Defense Forces would provide scramble lines, regulations and procedures, briefings, and training to insure efficient utilization of TAC's capability.

By the close of the year, similar mutual agreements had been completed with the Air Training Command, the Air Proving Ground, and the Air Force Missile Test Center for use of their fighter resources for air defense in the event of an emergency.[37] Of these organizations, the one capable of providing the most additional fighter strength was the Air Training Command. As EADF stated, the all-weather aircraft possessed by ATRC training schools ". . . plus the experienced instructor personnel constitute a large potential that could be utilized by the air defense system during the initial attack."[38] By the end of 1951, provisions had been made for the deployment of these resources for air defense.[39]

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36. ADC to TAC, "Use of TAC Fighter Forces in the Air Defense Role," 6 Feb 1952 (DOC 59).

37. As in fn 32.

38. EADF to ADC, "Augmentation of EADF All Weather Fighter Capability," 20 Oct 1951 (DOC 60).

39. ADC and ATRC, "Mutual Agreement for the Air Defense of the Continental United States," 9 Aug 1951 (DOC 61). The deployment of the fighter resources of the other major commands in an emergency would be dependent upon the priority of targets to be defended, the force available for this defense, and the combat capability of these forces. See the following: CADF to ADC, "Utilization of Tactical Air Command Forces in the Air Defense of the United States," 28 Sep 1951, and Inds. (DOC 62).

SECRET

EMERGENCY DEPLOYMENT: AIR TRAINING COMMAND

SECRET

VI

After the recall to active duty of the 21 ANG fighter squadrons in February and March 1951, there remained within the United States sixteen ANG fighter squadrons. Of these, fifteen were located within the LASHUP radar system and all were scheduled for recall and assignment to the Air Defense Command immediately upon the outbreak of hostilities.

In January 1951, ADC was authorized to order into active service such units of the Air National Guard as were required and to employ them as necessary in the event of an emergency.[40] An "emergency," as defined by this order, was[41]

> . . . an actual or imminent enemy air attack where time is of essence and in your opinion a request to this headquarters for approval for use of units of the Air National Guard of U. S. would unnecessarily delay the utilization of such units in active air defense.

ADC was authorized to delegate this authority to the Air Defense Forces in order to ". . . give the Commanding Generals [of these organizations], in the event of emergency, the immediate availability for use in an Air Defense role of . . . Air National Guard units within their area of responsibility . . . without wasting valuable time on lengthy administrative procedures."[42] No further

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40. TWX, USAF to ADC, 22 Jan 1951 (DOC 63). See also: Memo, General Twining to Chief, National Guard Bureau, "Use of ANG Units for Air Defense," 22 Jan 1951 (DOC 64).

41. TWX, as in fn 40.

42. ADC to WADF, "Use of Air National Guard Fighter Units for Air Defense," 19 Mar 1951 (DOC 65).

delegation or redelegation of this authority was to be made. Further, USAF was to be notified immediately of any exercise of this authority. In conveying these instructions to the Air Defense Forces, ADC said:[43]

> Units ordered into active military service under this authority will not be moved from present bases. However, the Commanding Generals of EADF and WADF may deploy combat elements of subject units as required to successfully accomplish the air defense mission.

The Air Defense Forces were then directed to prepare plans to be coordinated with the Continental Air Command, or such elements of that command as might be designated, and to brief ANG commanders concerned, which would insure efficient utilization of these units in the event it became necessary to order ANG units into active military service. Existing SOPs were to be thoroughly covered to insure the complete understanding of the ANG squadrons. These plans were then to be coordinated with the State Governors.[44] The Defense Forces implemented these instructions and, at the same time, went to work to secure authority from the Adjutant General of each state to effect close liaison with the units insofar as training was concerned and for mutual exchange of information concerning air defense operations.[45]

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43. TWX, ADC to Air Defense Forces, 27 Jan 1951 (DOC 66).

44. As in fn 43.

45. EADF, Operations Plan 1-51, "Ordering Air National Guard Units into Active Military Service under Emergency Conditions," 4 Sep 1951. See also: WADF Operations Plan 4-51, "Emergency Utilization of Air National Guard Units," 17 Jul 1951, DOC 30 , App. 1 of History of WADF, Jan-Jun 1951.

Concurrently with the recall of the tactical units of ANG, the necessary supporting units were to be ordered to duty. Recall procedures in an emergency were to be as follows:[46]

> Air Defense Command [would] exercise command/operational control of the units called in an emergency. The Commanding General of the respective Continental Air Command numbered air force in whose area of responsibility the units [were] located [would] assist the Commanding General of the [air defense force] in processing the units for active military service in accordance with Air Force Regulation 45-51, 15 September 1950, as amended. Immediately upon being ordered into active military service, and with the assistance of the Commanding General of the respective Continental Air Command numbered air force, [the] units [would] be processed as rapidly as is practicable without interfering with the primary mission of air defense. Continental Air Command Headquarters [would] establish plans and procedures for the numbered air forces to follow in assisting the Commanding General [of the Air Defense Force] in processing the units concerned.

In other words, at the time ANG squadrons were called to active military service, Air Defense Force Commanders were to take command of these units rather than just assume operational control over them as was originally contemplated.[47]

By mid-1951, the ANG fighter squadrons were all fairly well versed in pre-mobilization processing and in the use of USAF administrative forms. This would lessen considerably the initial process-

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46. 1st Ind., ADC to EADF, 20 Jul 1951, to EADF to ADC, "Use of ANG Fighter Units for Air Defense of the United States," 10 May 1951 (DOC 67).

47. See the following for information on the readying of ANG units for emergency air defense: CO, Maryland ANG, to EADF, "Squadron Alert Plan," 8 May 1951 (DOC 68).

ing time needed after mobilization. These problems were solved through the experience gained from the mobilization of ANG units in early 1951. The thinking in ADC Headquarters was that ConAC should retain the responsibility of processing these units after mobilization, with extremely close liaison between ConAC and ADC. It was also contemplated that all training supervision would become ADC's responsibility. Accordingly, it was suggested that[48]

> . . . in order to make these units immediately effective to the ADC mission. . . our training requirements should be considered to the point where we should monitor their quarterly training schedules and programs as well as actually check training in progress. It is further recommended that all ANG units earmarked for ADC be immediately given initial distribution of all regulations, etc., and continued pertinent training data, training standards, etc. This will serve a twofold purpose in that prior to mobilization and during training status, they will be preparing and becoming familiar with the functioning of ADC, and secondly, this will definitely tend to make them much more effective upon being recalled.

There was no improvement in the aircraft picture in the Air National Guard units during the latter half of 1951. In fact, there portended to be a lowering of the actual aircraft potential within the ANG squadrons in the immediate future. Because of aircraft shortages in Regular USAF fighter squadrons, it was expected that a number of the ANG F-51s would have to be transferred over to the Regular units. The remaining ANG F-51s would then be re-

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48. IRS, Col. James H. Price, Dir M&O, Hqs ADC, to O&T, 19 Jun 1951.

distributed among all the ANG squadrons on as equitable a basis as possible. This action would reduce the aircraft allotment of individual ANG squadrons to approximately sixteen aircraft per squadron.[49]

VII

This, then, was the status of the fighter-interceptor force at the close of 1951: ADC's assigned fighter-interceptor potential decreased during the last six months of the year because of critical overseas demands for aircraft and the inability of production to keep pace with these demands. While firm plans existed for the eventual build-up of this force to 57 squadrons, the interim between the end of 1951 and mid-1953, when the 57 squadron force was supposed to be attained, threatened to be a bleak one insofar as ADC's ability to defend the nation was concerned.

The process of welding together the fighter resources of the Navy, the other major Air Force commands, and the ANG for emergency air defense was almost completed by the end of the year. In view of the serious shortcomings of the assigned fighter-interceptor force, it was well that such good progress had been made in this direction. Principal drawback in these negotiations was that few of these augmentation forces were provided with aircraft equipped for night and all-weather operations. That shortage had been in the past, and would

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49. NGB to ADC, "Re-equipping of Air National Guard Squadrons," 15 Nov 1951 (DOC 69).

be for some time in the future, the Achilles heel of the fighter-interceptor program.

It was clearly evident from the evidence at hand that in the event of an emergency all the fighter units based within the continental environs of the nation would be trained in air defense tactics and prepared to assume an air defense role. It was assumed by the Air Defense Command that these units would be made available for emergency air defense in the event the attack came without warning. In spite of qualifying clauses in joint agreements with the Navy and in mutual agreements with the other major Air Force commands stating that in case the fighter resources of those organizations, at the time of attack, were required to participate in their primary missions they would be committed to those missions, ADC and everyone else suspected that at the outbreak of hostilities the only concern for all organizations would be for survival. In that event, ADC would assume operational control of all fighter units; no other organization would be prepared to assume that responsibility.

CHAPTER FOUR

ANTIAIRCRAFT

I

It appears paradoxical that antiaircraft artillery, a weapon designed for air defense purposes and used as such through two wars, did not assume its place as a member of the continental air defense team until late in 1950. That its entry into America's home defenses was delayed for so long may be attributed largely to two factors -- the gradual and recent emergence of a continental air defense system as a novel concept in American military thinking, and the painful process of adapting existing weapons, doctrines, and organizations to the requirements of this new concept.

The process whereby antiaircraft artillery, a component of the U. S. Army, was integrated into the air defense system and placed under the operational control of the Air Force is a tribute to the increasing spirit of cooperation which has characterized the growth of a national air defense effort.[1] This development, whereby a component of one service was dovetailed into the operational structure of another, was not achieved without great soul-searching on the part of both the Army and the Air Force, but in August 1950 the ulti-

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1. For a detailed account of the background of this inter-service doctrinal controversy see, ADCHR #1, chs. ii and x.

mate step was taken in making a total integration of the respective air defense capabilities of the two services a reality with the signing of the Vandenberg-Collins agreement. By the terms of this agreement, USAF was given authority over Army AA in functions of command which involved (1) the announcement of basic rules of AA engagement, (2) the specification of conditions of alert, and (3) the direction of the engagement and disengagement of AA fire.

The Vandenberg-Collins agreement also introduced organizational changes designed to ease the integration of Army AA into the air defense system. When the Army Antiaircraft Command (ARAACOM) was activated in the summer of 1950, its structural organization was made to parallel ADC's; regional Army AA commands were set up alongside the air defense forces and, where practicable, brigades were assigned to parallel the air divisions. As provided in the agreement, an AA officer with a staff of appropriate size was placed on each echelon of ADC. In addition to representing the AA on the staff of the ADC commander concerned, this officer was to serve as the principal AA advisor to the organization to which he was attached.[2] This close association proved of inestimable value in bringing about the integration of AA into the air defense system.

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2. ADCAA to CG EASTARAACOM, CG WESTARAACOM, and CG Central Army Antiaircraft Command, "AA Staff Sections with Air Defense Forces," 16 Jan 1952 (DOC 70).

II

The Commanding General of the ARAACOM wore two hats, so to speak. As the AA advisor to the Commander of ADC he participated in the planning for the air defenses of the U. S.; as AA Commander he executed AA plans. In December 1950, the Department of the Army confirmed this latter mission by relieving the several Zone of the Interior Armies of planning responsibility for antiaircraft defenses and by assigning this responsibility to the ARAACOM.[3]

In collaboration with ADC planners, the ARAACOM set out initially to answer two basic questions: What areas in the United States were to be defended by AA; and what AA forces were to be allocated to these areas. By the end of December 1950, an overall plan for the deployment of 66 AA battalions had been developed and agreed upon by ARAACOM and ADC. This plan was later approved by both the Departments of the Army and the Air Force.[4]

The deployment plan listed 23 vital areas to be defended by AA. Contained in these areas were the following four types of target complexes: key industrial, political and population centers; port and naval facilities; AEC installations; and SAC bases. The industrial, political and population complexes were to receive AA support

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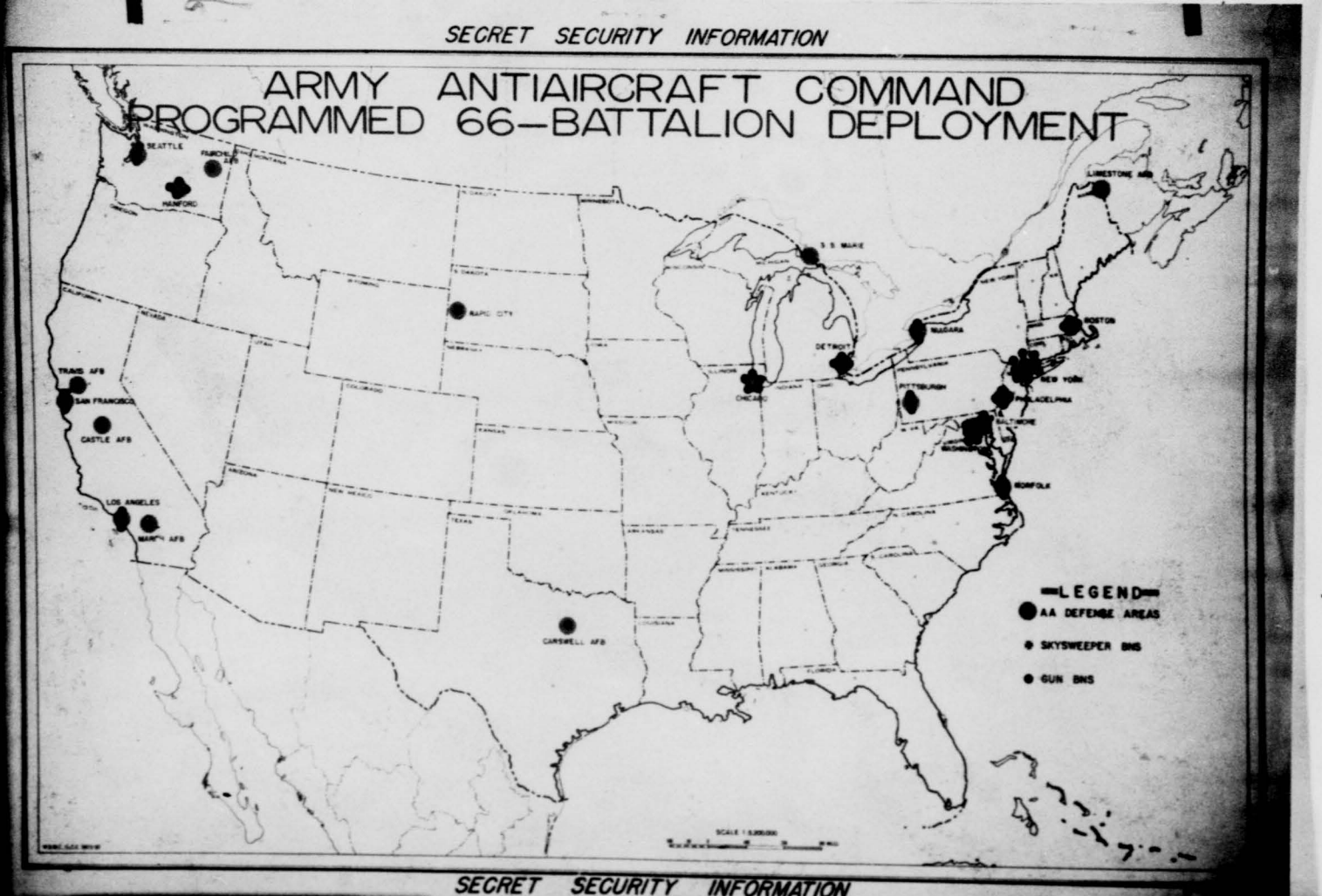
3. Presentation by AA Staff Section to Chidlaw, Aug 1951 (DOC 71).

4. As in fn 3.

SECRET SECURITY INFORMATION



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as follows:[5]

New York	10 battalions
Philadelphia	3 "
Baltimore	3 "
Washington	6 "
Boston	3 "
Norfolk	3 "
Chicago	5 "
Detroit	4 "
Niagara	3 "
Pittsburgh	3 "
San Francisco	3 "
Seattle	3 "
Sault Ste Marie Locks	1 AW battalion

Nearly all of these areas possessed critical port and naval facilities as well, and the emplacement of AA units within these localities was made with an eye towards protecting such installations. AEC installations were to be provided AA protection as follows: Hanford, four battalions; Sandia-Kirtland, two battalions; and Los Alamos, one battalion.

Seven SAC bases were to be defended. Since the AA defense over these targets was designed primarily against low-level bombing,

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5. From the point of view of population, most of the cities listed above ranked among the twelve most populous cities in the U. S. in 1950: (1st) New York, 8,160,000; (2nd) Chicago, 3,750,000; (3rd) Philadelphia, 2,100,000; (4th) Detroit, 1,623,000; (8th) Baltimore, 859,000; (9th) Boston, 770,000; (10th) Pittsburgh, 671,000; (11th) Washington, 663,000; (12th) San Francisco, 634,000. For the most part, most of these areas were also important as political and industrial centers. The presence of Niagara and Seattle in this list was explained by their importance as producers of critical industrial items, while Norfolk was listed because of its vital shipyards and naval facilities. The importance of the Sault Ste Marie Locks was readily apparent since 85% of the iron ore used by American industry passed through these locks.

automatic weapons (AW) battalions were deployed in these areas.[6] The SAC bases to be provided with one AW battalion each were: Limestone AFB, Maine; Rapid City AFB, South Dakota; Carswell AFB, Texas; March, Castle and Travis Air Force Bases in California, and Fairchild AFB in Washington.

With but a few minor changes, this deployment plan served as the blueprint for the actual deployment of AA units within the United States. In the fall of 1951, it was decided that the AA units originally allocated for the Sandia-Kirtland and Los Alamos areas were to be assigned elsewhere, and AA units located at Fort Bliss were assigned an emergency mission for providing the AA defenses for these areas. At the same time, Los Angeles was added to the list of localities to receive active AA support.[7]

As soon as the 66 AA battalion plan was firmed, actual deployment was begun with the AA resources on hand in the United States. In April 1951, all AA units in the country (except those undergoing training) were assigned to the primary mission of air defense, and command over these units passed from the continental Army commands to ARAACOM. This change had the effect of centralizing the control of all AA units assigned to the mission of air defense in the hands of a single command, thereby facilitating the implemen-

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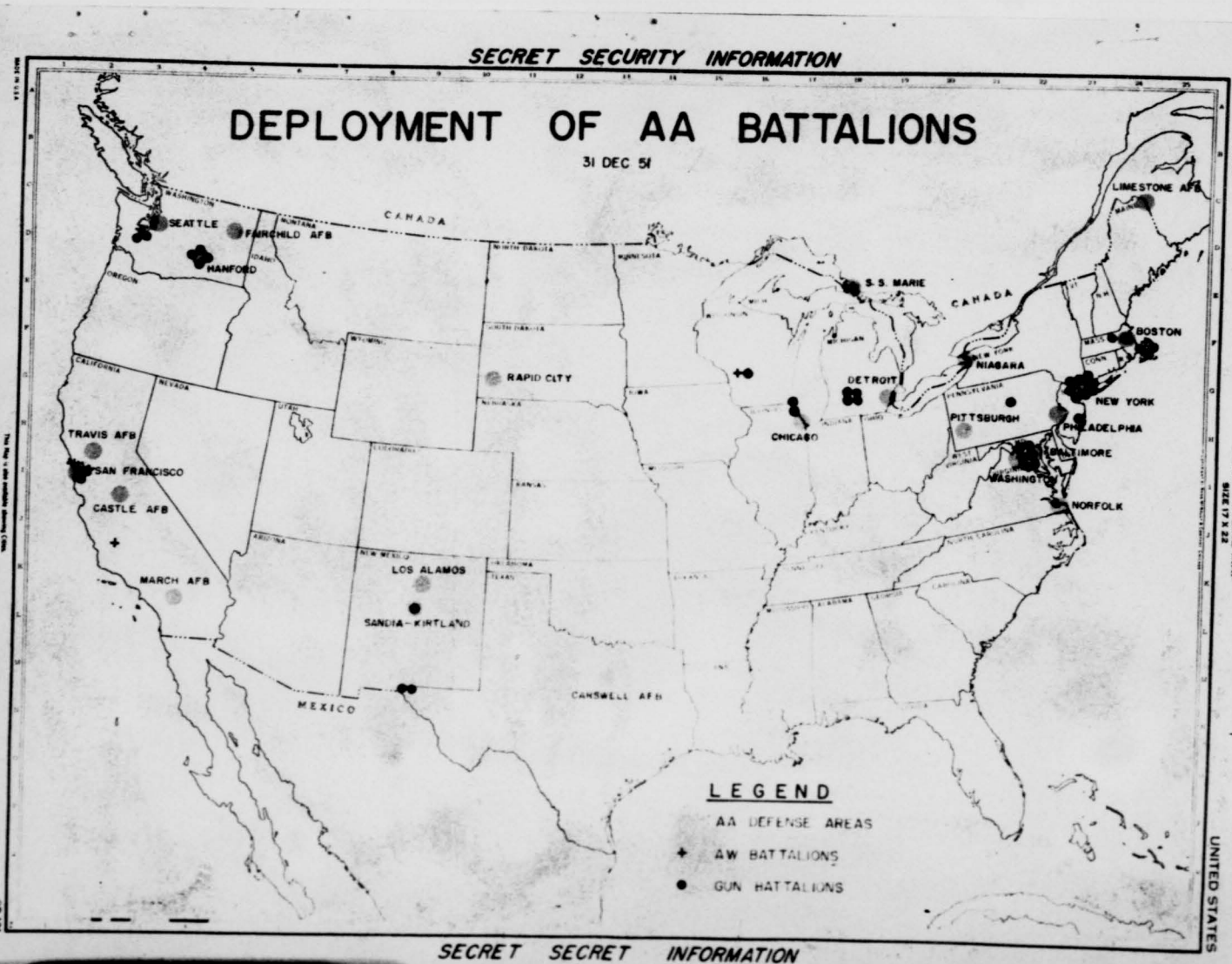
6. Automatic weapons were not expected to be effective against TU-4s. These units were scheduled to convert to 75mm radar-controlled Skysweepers sometime in 1952. [Presentation by Maj. Gen. Irvine to Commandant, General Staff College, 18 May 1951 (DOC 72)]

7. Information supplied by the AAA Staff Section of ADC.



tation of deployment plans. It also changed the status of ARAACOM from a planning agency manned by a mere corporal's guard to a full-sized command having responsibility over some 30,000 personnel who were organized into 38 AA battalions and additional supporting elements.

Having assumed responsibility for the deployment of AA units within the United States, ARAACOM found itself faced with a major problem. The Air Force components in the air defense system were deployed in their defense locations, and were operationally ready to engage in defense against air attack upon the continental United States. If the Army components in AA units were to be similarly ready, they had to be physically present at their battle stations. However, many of these units were maintained on a standby basis at camps and positions located some distance from their battle stations because a shortage of funds prevented the construction of permanent on-site installations.[8] In an effort to solve this problem, ARAACOM resorted to the stopgap measure of moving AA units into interim stations as close as possible to their on-site locations. In the fall of 1951 ARAACOM instituted an on-site rotation plan which aimed at placing at least 25 percent of all its operational units on-site where they would be operationally ready to perform their assigned

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8. Irvine to C/S, Department of the Army, "Stationing of Antiaircraft Units Available for the Air Defense of the United States," 14 Feb 1951 (DOC 73).

mission.[9] At the same time, ARAACOM concentrated on cutting down on the time lag required for moving AA units to their battle stations by improving communications, building access roads, and constructing hardstands for AA weapons.

III

As in the interceptor program, plans were underway in the antiaircraft program to organize all potential "outside" resources — in this case, those of the National Guard, the civilian populace, and the Navy — for emergency AA defense. In the fall of 1951, ARAACOM set out to ascertain which of the 90 National Guard AA units had an adequate combat effectiveness to qualify for immediate augmentation of the Regular AA defenses in the event of an emergency. The study revealed that the capability represented by the National Guard potential would make possible the establishment of AA defenses in an emergency in the following areas additional to the areas provided for in the 66 battalion deployment plan: St. Louis, Indianapolis, Duluth, Cleveland, Buffalo, Hartford, Oak Ridge AEC, Savannah River AEC,

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9. This rotation plan was to obtain to all AA sites where permanent rights of entry or executed leases existed, and would not include the SAC bases. ADOAA to COs, EASTARAACOM and WESTARAACOM, "On-Site Rotation Plan," 5 Oct 1951 (DOC 74).

and Barksdale AFB, Texas.[10]

To ascertain the suitability of civilians for such a combat role, tests were being conducted with experimental Civilian Antiaircraft Auxiliary Battalions. The nucleus of these battalions would consist of a hard core of military AA personnel supplemented by male and female volunteer civilians. If such an experiment proved successful, it would permit the release of physically qualified AA personnel for overseas duty. The inclusion of civilians into the AA defenses would harness the potential of the American people and would be another step in the direction of making the air defense system a national undertaking.[11]

Navy AA capabilities consisted of both shore and ship-based guns. The shore AA resources were composed of fixed installations in areas with critical Naval facilities, and their capability

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10. The importance of these areas was apparent at first glance. In 1950 St. Louis ranked 6th in population with 902,000; Cleveland 7th with 878,000, and Buffalo 14th with 575,000. The presence of Indianapolis and Hartford on this list was explained by the fact that the former produces 72% of the jet aircraft engines in the U. S., while the latter produces 78% of our conventional aircraft engines. Duluth was a strategic area since its loading docks handled 60% of all ore used by our industry. The presence of the AEC installations on the list was self-explanatory, and the SAC base at Barksdale AFB was sufficient justification for its inclusion.

11. ADOAA to Adjutant General, Department of the Army, "Civilian Participation in the Antiaircraft Program," 15 Mar 1952 (DOC 75).

remained relatively constant.[12] The ship-based AA capability, however, consisted of guns of vessels in port at the time. Naturally, only a rough approximation could be made of how many of the latter type weapons would be available for emergency air defense. Like Navy fighters, Navy AA could be scheduled for participation in air defense on an emergency basis only[13] and the authority to deploy such forces remained in the hands of the appropriate Naval commander.[14]

The joint agreements signed on Air Defense Force-Sea Frontier level permitted the establishment of firm operating procedures and training criteria for the readying of Navy AA for defense against a sneak atom-bomb air attack. In accordance with the agreements, Navy and Marine AA, including those guns aboard the ships,

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12. The most important naval installations where there was a substantial Navy AA capability included the following locations: Portsmouth, Me.; Boston, Mass.; New York, N. Y.; Philadelphia, Pa.; Washington, D. C.; Norfolk, Va.; Charleston, S. C.; Key West, Fla.; San Diego, Calif.; Long Beach, Calif.; San Francisco, Calif.; Seattle, Wash.; Alameda, Calif.; Monterey, Calif.; Oakland, Calif.; Stockton, Calif.; Whidbey Island, Wash.; Vallejo, Calif. See memo for Thatcher, "Potential Navy Air Defense Capabilities," 10 Apr 1950 (DOC 51).

13. This was in keeping with the Navy's primary functions which, as enumerated in the Key West agreement, were: (a) to seek out and destroy enemy naval forces and to supress enemy sea commerce; (b) to gain and maintain general sea supremacy; (c) to control vital sea areas and to protect sea lines of communication. [See ADCHR #1, pp. 239-244]

14. EADF Operations and Critique Report for Air Defense Exercise, 22-24 Jun 1951. See also: Interim State of the Policy of the Chief of Naval Operations Concerning Emergency Employment of Naval Forces and Facilities in Air Defense of the United States (DOC 187, ADCHR #1).

were to engage only targets specified by the ADDCs in designated air defense areas.[15] Orders to release fire were to be relayed from the ADDCs of the air defense system to Navy antiaircraft control stations and the latter would direct the fire of the Navy AA.[16] Where there was no Navy control station, the Army Antiaircraft Control Center in that area was to assume operational control. Maneuver reports indicated that, by and large, the integration of Navy AA into the air defense system by the end of 1951 was about as successful as could be hoped for.[17] One glaring fault revealed in these exercises was that Navy personnel were not always fully acquainted with the necessary reporting and other procedures called for on such joint operations. To overcome this obstacle, ADC suggested that Navy officers be assigned for training to elements of the air defense system.[18]

IV

A quantitative analysis of the AA units available and their deployment by no means provides a true representation of the AA de-

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15. This was true with the exception that a ship could fire on any plane committing a hostile act upon it.

16. As in fn 14, EADF Operations and Critique Report, 22-24 Jun 1951.

17. WADF Operations Summary of Operations Order 12-51, 22-23 Sep 1951.

18. ADC to USAF, "Assignment of Naval Officers to Elements of the Air Defense Command," 16 Aug 1951 (DOC 76).

fenses of the U. S. The qualitative aspect of the various weapons assigned to these defenses must be considered as well. As of the end of December 1951, there were five major conventional weapons in the AA arsenal — the 50 caliber machine gun, the 40mm gun, the 90mm gun, the 120mm gun, and the Skysweeper. The M-55 consisted of four 50 cal. machine guns on a single mount and represented the smallest of the antiaircraft weapons. It had a maximum range of about 1,000 yards and fired 2,000 rounds a minute. This weapon, along with the 40mm gun,[19] was designed for use against low-flying aircraft and for this reason was employed to defend such targets as SAC bases. The 90mm gun was much heavier than the above weapons and was designed for use against high-flying aircraft. It had a vertical range of about 35,000 feet and fired 25 pound projectiles at the rate of 25 rounds per minute. The 120mm gun, also designed for defending against high-flying aircraft, had a vertical range of about 40,000 feet and fired twelve 50 pound projectiles per minute.

The Skysweeper was a 75mm gun with an on-carriage radar and computer. It was conceived near the end of World War II as the weapon to overcome the major deficiencies of 40mm weapons — i.e.,

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19. The 40mm fired a two pound projectile at the rate of 120 per minute and was effective up to 8,000 feet. There was also a dual 40mm mounted on a left tank chassis, a self-propelled type, but this model was not allocated to the AA units within the ZI in most instances.

low range, low lethality, and inability to engage under night and bad weather conditions. It had an effective vertical range of about 19,000 feet and was capable of hitting targets flying at speeds up to 950 miles per hour. It had an automatic loading system which enabled it to fire 45 to 55 rounds per minute. As previously mentioned, Skysweeper battalions were scheduled to replace the AW battalions defending Sault Ste. Marie Locks and the seven SAC bases sometime in 1952.

Like the radar and fighter people, AA officers were planning for the use of the new weapons which research and development was readying for them. The programmed weapons for AA were surface-to-air guided missiles (SAM). The initial strategy to be employed once these weapons commenced to arrive would be to employ them to supplement the conventional type AA weapons. If they proved themselves to be combat worthy, the strategy would be reversed and the conventional type weapons would be used in support and the SAMs made the basic weapon for AA defense.

At least two guided missiles, the Terrier and the Nike, had reached sufficient maturity by the end of 1951 to be included in the programming for the immediate future. Thirty-two AA battalions were scheduled for conversion to these new weapons.[20] The Terrier was a short-range missile, designed to engage targets up to a speed of about 1,000 knots at 40,000 feet.[21] It had a warhead which weighed about

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20. Information supplied by the AA Staff Section of Headquarters, ADC.

21. Presentation by Capt. Lucius G. Hill, Jr., AA Staff Section, to Chidlaw, 4 Sep 1951 (DOC 77).

200 pounds. It was a beam rider type, i.e., it was launched and then picked up by a captive beam of the radar tracking the target and climbed up this beam to make the interception. Some AA battalions were scheduled for conversion to the Terrier in January 1953 and were expected to be operational and on-site six months later.[22]

The Nike was also a short-range, surface-to-air, guided missile but it represented a considerable improvement over the Terrier. It was capable of engaging targets at speeds up to 900 knots and at altitudes of 60,000 feet. Its warhead was half again the size of the Terrier's, weighing roughly 300 pounds. In contrast to the beam riding Terrier, the Nike was command guidance operated. Two radars were required to operate it, one to track the target and one to track the missile after it had been fired. By tying in a computer between the two radars, data on the incoming target was fed to the controls which operated the missile.[23]

Both the Nike and the Terrier had an inherent dead area because of the time required for the guidance systems to take over control of the missiles after they were fired. For this reason, projected plans for the employment of AA defenses called for the employment of conventional AA weapons against low and medium-altitude attacks and use of guided missiles against high-altitude raids. It was envisaged that both guided missiles and guns would ultimately be integrated in-

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22. As in fn 21.

23. As in fn 21.

to a single defense to provide coverage against low, medium, and high-altitude attacks.

V

Operationally, AA was tied into the AC&W system at the ADDC-AAOC level. At the ADDC, the air division defense commander exercised operational control over AA so far as the engagement and disengagement of fire was concerned. At the ADDC, AA officers were assigned to process and evaluate early-warning intelligence and to transmit other pertinent information to the AAOC.[24] Once this information was passed to the AAOC, the local AA defense commander could take action to integrate the firepower of his weapons into the air defense system.

The AAOC functioned as a communications center, provided facilities for controlling AA units, and was the agency responsible for the operational control of AA within a designated area. From here the AA operations officer alerted batteries, selected areas of search for gunlaying radars, and exercised tactical control of the AA weapons. Here, too, all information available to the AAOC from the AA representative at the ADDC was displayed for purposes of evaluation and dissemination. The AAOC was, in effect, the command post for a designated AA defended area.

The AAOC was dependent upon the ADDC for three important

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24. ADC to AG, Dept of the Army, "Army Representation at Air Defense Direction Centers," 10 Jul 1951 (DOC 78).

functions: early warning; identification; and "hold-fire." Unless the AAOC received sufficient early-warning, it could not man and operate its equipment effectively. The range of gun-laying radar was limited to 70,000 yards, and if raid data such as altitudes were not furnished, the potency of the AA weapons would be severely curtailed. In the matter of identification, the AAOC was particularly helpless and dependent upon the ADDC. The rules of engagement laid down by ADC stated that AA could fire only on a hostile aircraft or on an aircraft which committed a hostile act. Consequently, in most instances the source of identification of a hostile aircraft would be the ADDC.[25] The third important function performed by the ADDC was to send a "hold-fire" order when necessary to allow passage of friendly aircraft through a given area.

The ADDC-AAOC team revealed certain basic weaknesses in operation. It became obvious that GCI controllers at the ADDCs were in many instances not taking full advantage of the AA weapons at their disposal. There was a tendency on the part of the controllers, being Air Force personnel, to rely too heavily upon the fighter-interceptor, a weapon they knew well, and to disregard the potential of the Army AA because they did not have intimate enough knowledge of the characteristics of the guns under their control.

In an effort to break down the provincialism of the GCI controllers in this matter, schools were set up to indoctrinate both

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25. ADCR 55-1, 7 May 1952 (DOC 79).

ADDC and AAOC personnel in the potentialities of both the fighter-interceptor and AA. The plan was simple: An AAOC and gun battery were set up adjacent to an ADDC, and the physical presence of the two served as a reminder to the controller that he had other weapons at his disposal besides interceptors. Selected GCI controllers and AA liaison officers were assigned to a short course at Truro, Massachusetts, where they had an opportunity to witness the operation of their respective installations and to iron out common problems.

In early 1952, ADC rewrote the regulation prescribing the rules of engagement for AA. The intent of the revision was to eliminate certain misconceptions which had arisen in connection with the operational control of AA weapons by ADCC and GCI controllers.[26] Although the basic concept of operational control remained unchanged, the new regulation had the effect of granting the AA units wider latitude in employing their weapons.

The major changes in this new directive concerned the action status of AA weapons. The term "release fire" was replaced by the terms "guns free" and "guns tight." Under the old regulation the condition of "release fire" was permitted only when an aircraft had been recognized as hostile or determined as hostile by the air division defense commander.[27] In other words, there had to be positive identi-

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26. See ADCHR #1, pp. 234-235.

27. ADCR 55-1, 14 Feb 1951 (DOC 185, ADCHR #1).

fication of hostile before the new "release fire" order could be given. The term "guns tight" in the new regulation imposed the same conditions as did the term "release fire" in the old regulation.

The new term of "guns free" permitted AA units to fire at all aircraft except those specifically identified as friendly.[28] In gun defended areas (GDAs), to be designated by the Commanding General of ADC, the normal status under the new regulation would be "guns free." As soon as emergency control of air traffic had been effected, AA units would be permitted to fire at all aircraft within these areas which were not identified as free. In all areas other than GDAs, the normal status of "guns tight" was to obtain.

The status of "guns free" would apply automatically to any AA defense area subjected to a hostile act.[29] This was of particular importance in the event of an initial attack, because it would permit the immediate employment of AA capabilities. The AA commander would not be hamstrung by having to await fire orders.

If communications between the ADDC and the AAOC were knocked out, the normal status of the AA defended areas would apply. In

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28. As in fn 25.

29. The following actions by aircraft were to be considered hostile, unless previous notification was received that such actions were scheduled for operations or training within the specific area and time in which they occurred: (1) Aircraft released bombs or fired guns, rockets, or other weapons at any friendly air, ground, or water target other than in recognized weapons ranges, or (2) aircraft conducted mine-laying operation. There was a serious limitation to be noted here, since AA weapons could be employed only after a hostile act had taken place.

other words, any restrictions which had formerly been passed down by the ADCC would no longer be applicable. For example, if certain restrictions had been imposed on the AA units within a GDA by the ADDC, in the event communications were severed, these restrictions would no longer obtain, and the GDA would revert to a "guns free" status.

The main reason for these changes was a misconception which had arisen in the interpretation of the original regulation. The "hold fire" condition as expressed in the previous regulation had been meant to apply only to specific aircraft, areas, or corridors, and not to entire AA defended areas. However, in the application of these directions, the "hold fire" condition was applied to entire AA defended areas by misinformed GCI controllers. In order to clarify and correct this situation the revised regulation specifically stated that "hold fire" would not be made applicable to an entire AA defense area, but rather was to apply only to specific aircraft, sectors, altitudes, or corridors.

By the terms of the revised regulation, the air division defense commander could authorize the AA commanders to identify aircraft by visual, aural, or electronic means of demonstrated effectiveness. This was taken to mean that as soon as Mark X IFF was put into use for identification purposes, the AA, under certain circumstances, would be able to identify on its own and the air defense commanders could delegate to it the responsibility for such identification.

CHAPTER FIVE

ORGANIZATION

I

The events leading up to the reestablishment of the Air Defense Command as a major USAF component (as well as a general presentation of the vicissitudes of air defense organization from March 1946 through December 1950) were traced in the previous history.[1] In October 1950, General Ennis C. Whitehead, the ConAC Commander, strongly reiterated to USAF Headquarters his belief that ConAC was unable to continue to handle such a growing and vital concern as air defense. "In order to cope with the growing Air Defense System and its problems," the General stated, ". . . it [was] a matter of utmost urgency to separate the headquarters of the Air Defense Command from Continental Air Command."[2] By 1 January 1951, this expression had received official sanction and the new command was in operation, with headquarters at Ent Air Force Base in Colorado Springs, Colorado.[3]

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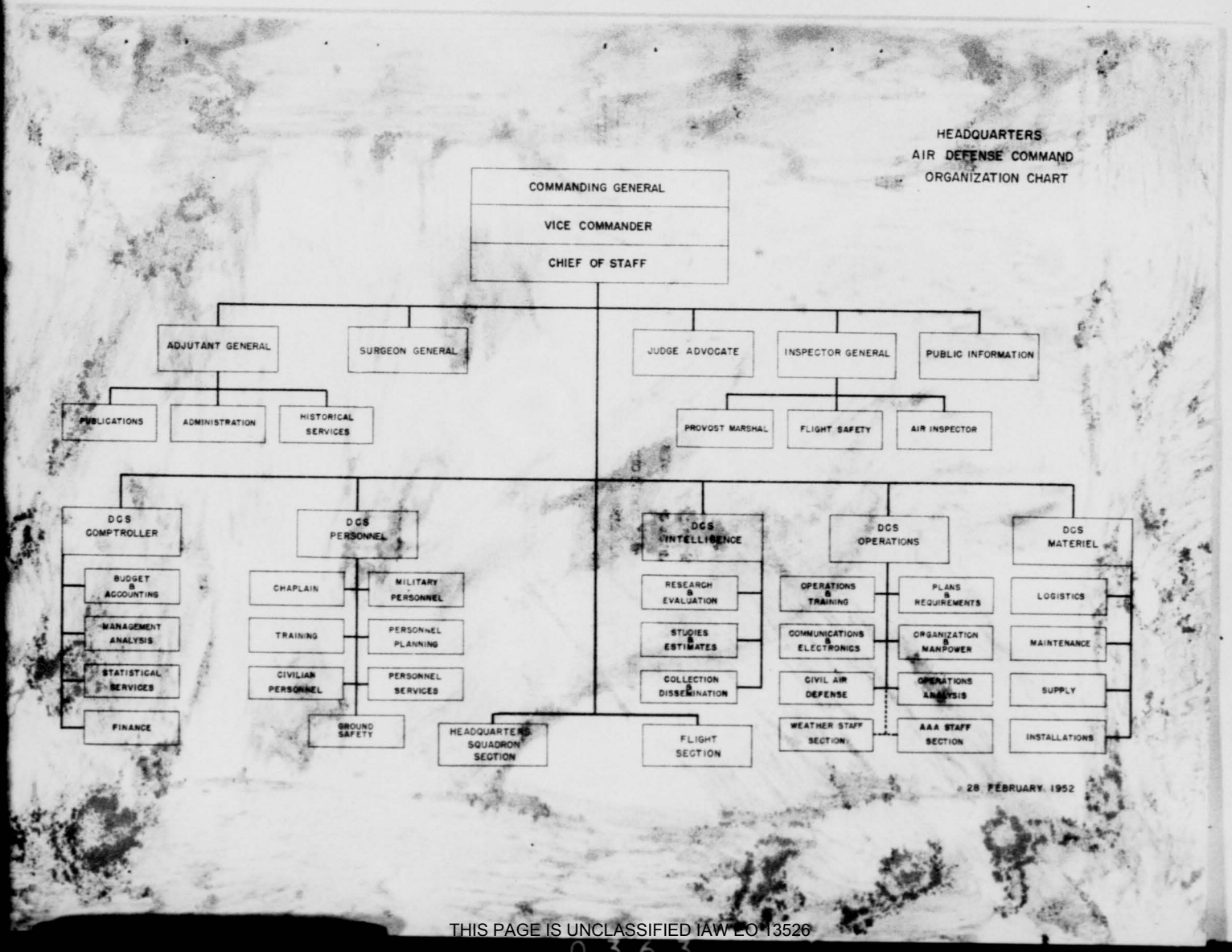
1. See ADCHR #1, ch. ix.

2. ConAC to USAF, "Separation of the Hq Air Defense Command from Hq Continental Air Command," 24 Oct 1950 (DOC 80).

3. ADC's mission was set forth in AFR 23-9, 15 Nov 1950 (DOC 81). The headquarters was reestablished as set forth in ADC General Order #2, 1 Jan 1951 (DOC 82). Personnel to staff the Headquarters were predominantly those who had been performing air defense functions under the old ConAC organization, reference the above cited G. O.



II

One of the first acts of the ADC Headquarters was to examine the efficaciousness of the manner in which its resources were organized. Discussions and plans drawn to this effect in January 1951 were in reality the continuation of actions initiated by ConAC in 1949 and 1950. The consensus of the reports of maneuvers in these years was that both fighter wing and air division organization required drastic overhaul.[4] The 23-squadron deployment program, which resulted in the physical separation of squadrons from their parent organizations, revealed the wing-base type of organization as an anachronistic concept so far as air defense requirements were concerned. The assignment of only operational control over fighter-interceptor squadrons to the air divisions was viewed by some division commanders as another indication of weakness in the air defense structure, and it was their recommendation that complete command authority over all combat elements within their division sectors, including the fighters, be granted them.[5] General Whitehead and his staff were aware of these problem areas but also were convinced that additional experience with the new science of air defense was

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4. ADC Manpower and Evaluation Board Report on Organization, 1 Jan 1951.

5. As in fn 4.

required before actual reorganization could commence.[6]

Early in January 1951, the Headquarters ADC Manpower Evaluation Board (MEB) issued a report in which were assembled the opinions of many leading ADC personnel on the subject of air defense organization. Most of these persons favored the increase of divisional powers to include actual command of the wings. At the same time, the element of indecision as to the workability of such an organization was in evidence. To award administrative and logistical, as well as operational, responsibility of all combat elements within his sector to the air division commander was diametrically opposed to the premise that his chief job was to operate the intricate defenses of the sector - a responsibility which might well be impeded by administrative and logistical distractions. What all air defense personnel agreed upon, however, was the necessity of effecting closer rapport between pilots and controllers, whether it be by making their respective command channels coincide or by some other process.[7]

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6. In late September 1950, Gen. Whitehead revealed his thinking at that time on the type of organization which he felt necessary for air defense when he stated that he felt ". . . experience /would/ show the advisability of the air divisions assuming wing functions thus eliminating the wing but perhaps retaining the group headquarters to perform supervisory and training functions only." Concerning the reasons why he did not deem it advisable to put this thinking into an official recommendation to higher headquarters that such an organization be effected at that time, the General, in the same correspondence, stated: ". . . no deviation is planned for the immediate future until more experience is gained and due to EWP /Emergency War Planning/ commitments involving overseas deployment." /See TWX, ConAC to AAC, 11 Sep 1950 (DOC 83)/

7. As in fn 4.

The MEB Report concluded that (1) there was a lack of unity of command below air defense force level, (2) there were superfluous units at air division headquarters level,[8] and (3) the wing-base organization was not adaptable to the requirements of air defense. On the basis of these findings, it was recommended (1) that the AC&W group headquarters and the Control Centers be eliminated and their responsibilities invested in the air division headquarters, and (2) that fighter-interceptor wing and group headquarters be eliminated (as well as those wing supporting elements which could be operated by augmenting the independent fighter squadrons) and the fighter squadrons assigned directly to the air division headquarters. The proposal, in support of the latter recommendation, was to augment the fighter squadrons sufficiently to permit them to operate either as tenants or as self-sufficient entities with their own support facilities.

At about the same time the MEB Report was published, EADF Headquarters came up with its own plan for reorganization of the air divisions.[9] It was EADF's recommendation that the entire AC&W structure be placed directly under the air division headquarters. This was to be achieved by reducing the AC&W groups and by inactivat-

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8. The ADCC was operated by the control squadron. In reality, however, personnel of the division headquarters supervised its activities in their capacities as controllers and commanders, so that many believed that the squadron organization could be eliminated without changing the status quo in the least. The same was true of the AC&W group headquarters, which in almost all instances was identical, personnel-wise, to the division headquarters.

9. See ADCHR #1, DOC 171 .

ing the control squadrons and adding the personnel assigned these units to the division headquarters. Although EADF did not recommend the complete elimination of the AC&W group headquarters, there was no question that EADF was thinking along these lines.[10] As to the problem of division control of the wing's resources, EADF preferred not to alter the present arrangement. Mobility of fighter forces was deemed necessary so that these units could be shifted on short notice about the Zone of the Interior or readied for overseas deployment.

III

The discussions aroused by the MEB Report and the EADF staff study prompted General Whitehead to call a full dress conference of his air defense force commanders and staff in February 1951 to seek a solution to the organization problem. While no concrete conclusions were reached at the meeting, the decision was made that each air defense force would experiment for a six-month period with what organizational structure it felt best, after which time the problem would be examined anew with the intent of standardizing air defense

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10. The EADF staff study recommended the retention of the AC&W group headquarters at record strength in case the number of radar squadrons increased to such an extent that more than one AC&W group headquarters would be required to supervise their operations.

organization command-wide.[11]

While the air defense forces went ahead with this project, ADC headquarters went to work on one of the most troublesome points in the air defense structure - the logistical support of AC&W squadrons and detachments. In many instances, logistical support of these units was provided by the air division headquarters through the AC&W groups; in other cases, this support came from the fighter-interceptor wings through their air base facilities. For lack of definite direction on this matter, supply hardship frequently resulted in outlying radar installations. In April, General Whitehead determined to fix responsibility for logistical support of the AC&W units on the fighter-interceptor wing commanders. On the 27th of that month, the air defense forces were informed of a plan whereby each ADC unit would be assigned to an ADC fighter-interceptor wing for logistical support. In this same correspondence it was proposed that the responsibilities of each air division commander

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11. The air defense forces went to work immediately on the problem. Ambitious attempts at reorganization by EADF came to no avail, however, because of technicalities about assignment of personnel to provisional organizations. (see History of EADF, 1 Jan-30 Jun 1951, pp. 50-74). Similar technicalities prevented WADF from carrying a proposal to establish a "provisional air defense wing" in the 25th Air Division. (Interview, Maj. C. M. McGillivray, M&O, Hqs ADC). CADF was not sufficiently old to have much to say at this time, although after July it entered into reorganization discussions with much gusto. (History of CADF, 1 Jul-31 Dec 1951, pp. 53-63.) The abortive efforts to reorganize in the air defense forces, however, had their valuable lessons for ADC. They showed the necessity for meticulous planning and coordination in any further direct efforts to change the air defense structure by emphasizing that ADC had to reckon with USAF Headquarters' requirements.

be reduced to those directly associated with ". . . his primary reason for existence . . . the determination of when to fire at unidentified aircraft."[12]

In May 1951, air defense force materiel representatives met at ADC Headquarters to discuss the logistics plan. This conference resulted in the publication of a directive on 12 May to the defense forces incorporating the provisions of this plan.[13] The result was a great increase in the responsibilities of the fighter wings for logistical support of the AC&W units.[14]

Meanwhile, the air defense forces had readied their recommendations regarding organization in accordance with the assignment accorded them in April. EADF contributed an extensive study on the wing structure,[15] criticizing wing organization as it presently stood and as it was proposed in a new Air Force Regulation on the subject.[16] EADF believed that the wing could not support separately deployed squadrons if its supporting services remained on the same base with

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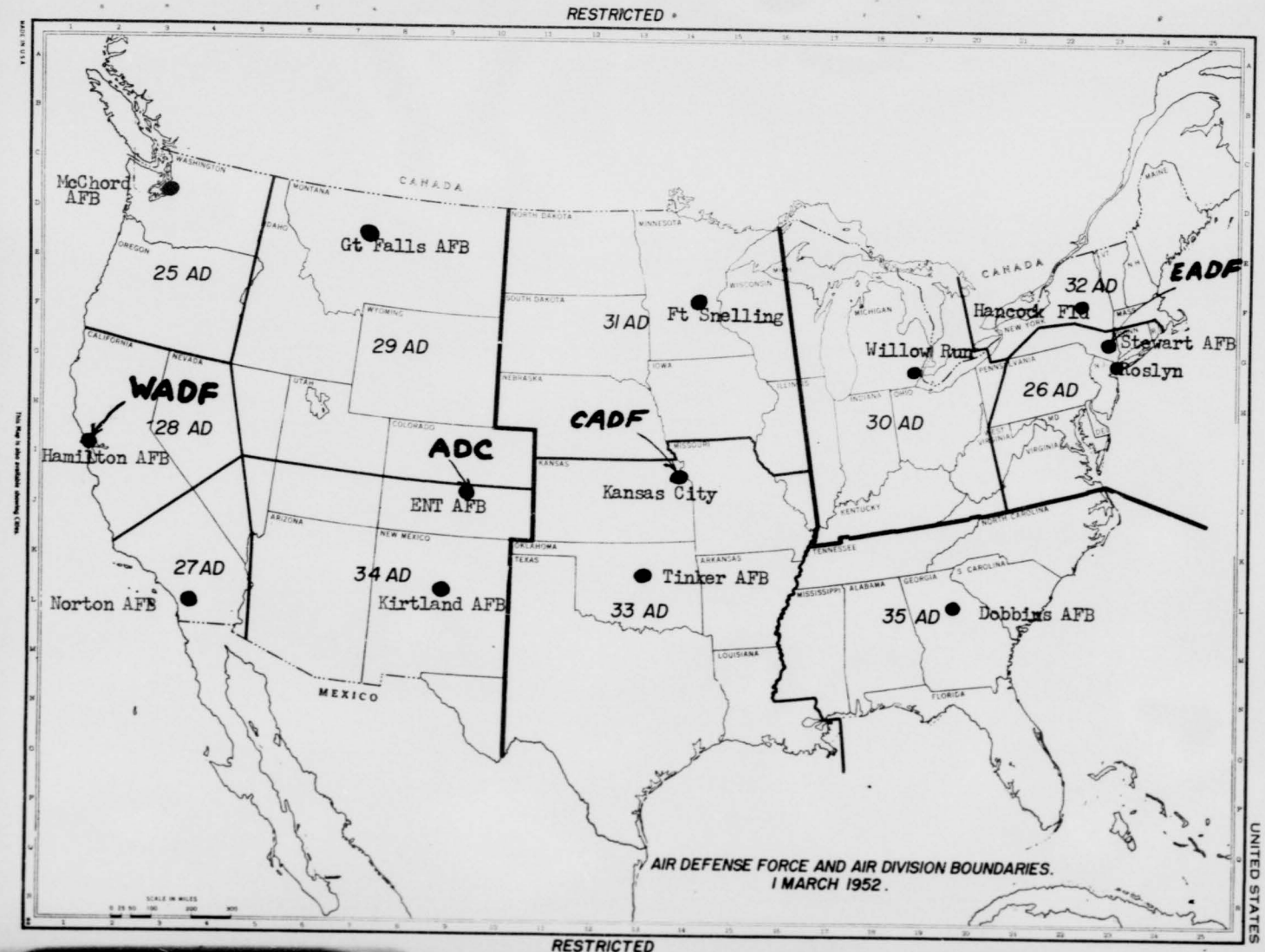
12. ADC to EADF, "Organization for Air Defense," 27 Apr 1951 (DOC 84).

13. ADC to EADF, "Organization of Air Defense," 12 May 1951 (DOC 85).

14. The only exceptions to this rule were to be those ADC installations in sectors where no divisions were located, for example, in Montana and New Mexico. Organization and field maintenance of communications and electronics equipment were to remain the responsibility of the AC&W squadrons. Depot maintenance of this equipment was to be the responsibility of the depots of the Air Materiel Command (AMC) or designated contractors.

15. See ADCHR #1, DOC 170 .

16. AFR 20-15A, 11 Jun 1952.



the wing headquarters. Each squadron, according to EADF's thinking, had to have its own supporting unit, tailor-made to meet its particular requirements. To effect this, the base commander had to be the base supporting unit commanding officer. As to the wing headquarters, it was recommended that its personnel be split among the air bases, leaving it with a large operations and inspection staff and little else. Fighter-interceptor group headquarters were to be reduced to record strength; and each wing was to have at least three but no more than five air bases under it.

Central Air Defense Force's recommendations were somewhat more drastic than EADF's. That headquarters proposed that the air division receive unmitigated control over both the AC&W and fighter elements by the placement of the wing under the air division and the elimination of the AC&W group headquarters.[17] WADF appeared to be content with the existing wing structure, recommending only the elimination of the AC&W group headquarters where only one group existed within the division. If more than one group were necessary in a sector, then WADF favored the re-establishment of such groups to relieve the air divisions of the responsibility for supervising the activities of the far-flung AC&W squadrons.

By the middle of July 1951, ADC Headquarters considered that reorganization matters had reached a head and informed the air defense

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17. CADF Staff Study on Air Defense Organization, May 1951. See ADCHR #1, DOC 169.

forces that the following changes in air defense organization were under consideration: (1) placement of all AC&W groups under the air division headquarters; (2) retention of wing headquarters to command all fighter elements, as previously, except that the concept of the air base group was to prevail, incorporating within it all the multifarious support activities previously in the domain of the materiel, supply, and medical groups; (3) retention of the fighter group; and (4) expansion of air division headquarters sufficiently to permit them to effectively carry out command supervision of the AC&W groups and units and to absorb the operating sections formerly associated with the control centers. In the case where only one AC&W group was located in an air division area, the air division and AC&W group would operate jointly as one headquarters. The capability of this joint headquarters would be similar to that of an air division operating independently and would be manned sufficiently to completely supervise and command assigned AC&W squadrons.[18]

Headquarters ADC was by no means uniformly favorable to its own decision in this matter. To many of the staff, the result of such a reorganization would be to patch up existing deficiencies but to leave intact many of the most troublesome questions, namely, the relations between the air division and the wing. Others felt that the plan was remiss in that the air division was assuming too much of a workload in view of its primary responsibilities of operational

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18. ADC to CADF, "Organization for Air Defense," 16 Jul 1951 (DOC 86).

control of the entire sector defense.[19]

USAF Headquarters' attitude toward ADC's extensive labors on reorganization had been favorable. In August, that headquarters informed that it had directed the Air University to assist in studying the problem to see if any item of importance had been overlooked in the effort to streamline air defense organization.[20] USAF's most important contribution, however, took place at the USAF-wide commanders conference at Colorado Springs in August 1951; at that meeting it was announced that ADC was relieved of the commitment to ready entire fighter wings for overseas shipment. Although ADC would still be required to provide planes and crews as required to support the Korean action or to bolster USAF forces in Europe, retention by ADC of the wing structure set forth in AFR 20-15 would no longer be necessary.

IV

In September 1951, General Chidlaw[21] informed USAF Headquarters that he felt the time was ripe for reorganization of the Air Defense Command. The lifting of the requirement for overseas shipments of

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19. Correspondence contained in files of Directorate of Manpower and Organization, Hq ADC.

20. USAF to ADC, "Organization of the Air Defense Command," 15 Aug 1951, with incls. (DOC 87).

21. Gen. Chidlaw assumed command of ADC in Aug 1951. For biographical sketch see DOC 88.

wings now permitted ADC to consider a complete overhaul of its wing-base structure. General Chidlaw indicated that ADC would have its reorganization plans ready for USAF's approval by early October. Urgent action by both ADC and USAF was required on the matter, the General pointed out, because of the impending reduced personnel ceilings called for by the FY 1954 USAF program.[22]

Shortly thereafter, ADC's proposal for reorganization was submitted to higher headquarters. Generally, the plan called for the expansion of the air division headquarters to encompass functions formerly performed by the AC&W groups and the control centers. No assumption of command responsibility by the air divisions over the wings was contemplated, which decreed that the air divisions would continue to have operational control over the fighter squadrons with the wings retaining logistic and administrative authority over these units. It was pointed out that the nation-wide air defense structure could not be a homogeneous one, that regional variations would have to prevail as necessary. In the case of the 31st Air Division, it was proposed that that organization be permitted to conduct, on a six-months basis, an experiment in the placement of all units, fighter as well as radar, under air division headquarters.[23]

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22. Chidlaw to USAF, "Reorganization of the Air Defense Command," 24 Sep 1951 (DOC 89).

23. ADC to USAF, "Reorganization of the Air Defense Command," 2 Oct 1951 (DOC 90). Actually, three other air divisions, the 29th, 34th, and 35th, would have command authority over all air defense elements within their assigned sectors but this was only because there were no fighter squadrons deployed in these areas.

Under the proposed reorganization, the wing as it existed would be eliminated and a new wing headquarters be activated to which the fighter squadrons would be directly assigned. To relieve the tactical squadron commanders of logistical and other distracting concerns, each fighter squadron would have on the same base with it a tailor-made support group, of squadron or group size as the situation demanded. USAF Headquarters ". . . concurred in the broad organizational concept proposed by ADC and considered it excellent."[24] At the same time, higher headquarters questioned certain aspects of the proposed reorganization. The splitting of the air base into two organizations - fighter-interceptor squadron and air base unit- with no one commander over both units appeared to be that headquarters' major concern in the matter. Such an organization, USAF stated, ". . . creates many problems in the administration of the Air Base. Many day-to-day problems will have to be resolved at a higher level which could ordinarily be settled at base level if one commander was in charge of both Air Defense organizations." ADC granted that some problems in this regard were bound to arise, but the fact that both the base echelons would, in effect, report directly to one person, the wing commander, led ADC to believe that the plan was feasible.[25]

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24. USAF to ADC, "Reorganization of Air Defense Command," 12 Oct 1951 (DOC 91).

25. ADC to USAF, "Reorganization of Air Defense Command," 8 Nov 1951 (DOC 92).

The road now seemed clear to ADC to go ahead with its reorganization. This was early November 1951, and USAF indicated that it would start the ball rolling by 8 February 1952. General Chidlaw, however, for reasons given previously, was impatient for the reorganization to begin sooner if at all possible. On the 6th of December, he spoke to Brigadier General Roger Brown, in charge of Manpower and Organization at Headquarters, USAF, concerning the possibility of accelerating the reorganization and was given the signal to proceed immediately. When ADC attempted to expedite action, however, it found to its chagrin that the deactivation and activation of units could only be accomplished by USAF.[26] There was no way to circumvent this bit of red-tape. Finally, on 20 December, official confirmation of the proposed reorganization arrived, establishing 8 February 1952 as R-Day.[27] ADC immediately directed its air defense forces to plan for the following, after taking care to insert the caveat that only USAF was empowered to activate or inactivate units:[28] (1) the inactivation of all fighter-interceptor wings, tactical groups, and wing support units; (2) the inactivation of all air divisions, AC&W groups, and AC&W control centers; (3) the organization of all air

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26. TWX, Chidlaw to USAF, 8 Dec 1951 (DOC 93).

27. USAF to ADC, "Reorganization of Air Defense Command," 20 Dec 1951 (DOC 94).

28. ADC to WADF, "Reorganization of Air Defense Command," 4 Jan 1952 (DOC 95).

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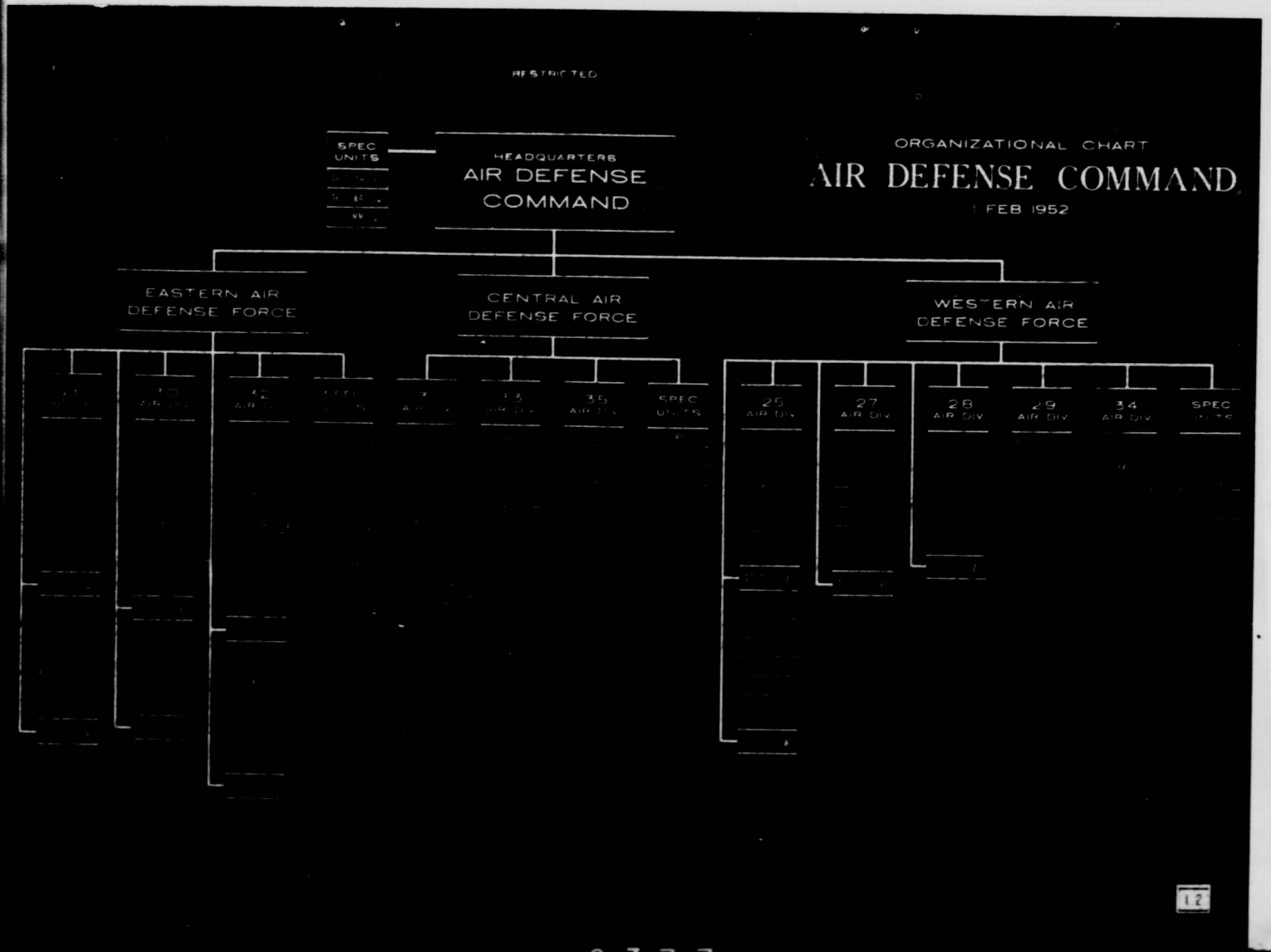

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divisions as table of distribution units; (4) the activation of table of organization and equipment air base groups and air base squadrons; and (5) the assignment, reassignment and transfer of all fighter-interceptor and AC&W squadrons.

On 3 January 1952, authority was received to put the reorganization into effect[29] and on the 11th of that month an ADC General Order was issued on the subject.[30] The detailed account of this reorganization and the results of the organizational experiment conducted in the 31st Air Division remain, of course, subjects for treatment in the next history.

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29. USAF to ADC, "Reconstitution of the Air Defense Command," 3 Jan 1952 (DOC 96).

30. ADC General Order #2, 11 Jan 1952 (DOC 97). See also: ADC General Order #4, 11 Jan 1952 (DOC 98).

CHAPTER SIX

IDENTIFICATION

I

The problem of identification, examined in considerable detail in the previous history,[1] remained ". . . one of the weakest links in our chain of defense."[2] Here was an area where interim methods of air defense prevailed almost exclusively. For lack of adequate IFF (identification friend or foe) electronic equipment, communication between ground radar stations and civilian and military aircraft for identification purposes was practically non-existent. Such expedients as flight plan correlation, interception for identification, establishment of areas over which flying was prohibited or restricted, etc., were initiated and supported at considerable hardship and expense. Under ideal climatic conditions, these procedures were fairly effective; no one was optimistic enough to aver, however, that these methods afforded adequate means of isolating the enemy from the friend among those aircraft penetrating the air defense net at night or during instrument weather conditions.

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1. See ADCHR #1, chs. xiv, xvii.

2. TWX, CG, ADC, to Major Subordinate Commands, etc., 19 Mar 1952 (DOC 99).

II

Peacetime control of military and civilian air traffic movement for identification purposes by means of flight plan correlation had made considerable headway by the end of 1951. As has been related, the first major advance in this direction was made in mid-1950 with the publication of AFR 60-22, which directed the establishment of a number of ADIZs (air defense identification zones) within the zone of the interior.[3] These zones were broken down into three types -- domestic, coastal, and international boundary.[4] The filing of flight plans was made mandatory (with a few exceptions) for all military aircraft entering or operating within these areas, and this information was forwarded to appropriate ground radar stations. In December 1950, the CAA was given authority to make mandatory the filing of flight plans by civilian aircraft (except for certain local flights) operating within the ADIZs by Executive Order 10197 following passage of Public Law 778. This enabling legislation, coupled with the provisions of AFR 60-22, afforded the air defense system its first real control over peacetime air traffic. Executive orders prohibiting civilian flying over AEC installations

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3. See ADCHR #1, ch. xiv.

4. The domestic zones were those ADIZs which lay primarily in the interior of the United States surrounding critical target areas. The coastal zones were established along the Atlantic and Pacific. The international boundary ADIZs were those on or adjacent to the international boundary of the U. S.

also strengthened the air defense system's hand in this respect.[5]

ADC's labors on the peacetime control of air traffic during 1951 were concerned primarily with expanding the ADIZ system and in eliminating "bugs" in the procedural aspects of flight plan correlation. Early in 1951, AFR 60-22 was revised to include movement of the coastal ADIZs, which had been coincidental to the shore line, some distance out to sea.[6] Later in the year, ADC requested that the areas subject to air traffic control be expanded to keep pace with the rapidly expanding radar coverage.[7] USAF agreed to this proposal and new ADIZs were designated at Great Falls, Minneapolis, Traverse City, and Bangor. At the same time, the international boundary ADIZs were changed; the Canadian boundary zone was expanded and a new ADIZ was created along the Mexican border.[8] The map which follows shows that by the end of 1951 ADIZs existed across the northern boundaries of the United States and extended along the Atlantic and Pacific coasts.

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5. Small prohibited areas were established over the AEC plants at Hanford, Los Alamos, Oak Ridge and Savannah. Executive orders stipulated that in order to operate interceptors over these same areas arrangements would have to be made with the AEC representatives concerned. /ADCR 55-24, 9 Nov 1951 (DOC 100). See also: (Div of Security) to ADC, 3 Mar 1952 (DOC 101)/.

6. See ADCHR #1, pp. 329-330.

7. ADC to USAF, "Changes in Air Defense Identification Zones," 15 Jun 1951 (DOC 102). For a discussion of the vigorous protest made by EADF to ADC's proposed change in ADIZs, see EADF History, 1 Jan - 30 Jun 1951, pp. 229-234.

8. ADC to USAF, "Amendment to Air Defense Identification Zones," 8 Aug 1951, and 1st Ind. (DOC 103).

RESTRICTED

RESTRICTED

Action taken to increase the efficiency of flight plan correlation methods was directed toward resolution of the following problems: (1) difficulties in processing and disseminating flight plan information to the air defense system; (2) control of air traffic in areas of high traffic density; (3) inadequate provisions in AFR 60-22; and (4) procedures for identifying incoming overseas flights.

Data received by the air defense system from the CAA, MFS, and Canada concerning scheduled flights through the ADIZs was often in unusable form or was received too late to be of any value. The GCI stations were then confronted with the task of attempting to correlate in a hurry this mass of data into meaningful form. Since the GCI stations were undermanned, the best average for flight plan correlation by individual stations was around 74%, a figure far too low for purposes of accurate identification.[9] In order to relieve the GCI stations of this duty and to streamline the flow of flight plan data, ADC authorized the establishment of experimental Air Movements Identification Sections (AMIS) in the CAA Air Route Traffic Control Centers (ARTCCs).

Two AMISs were set up in the first half of 1951, one in Boston and the other in Seattle, to provide central locations for the collection, processing, and dissemination of pertinent flight plan information to specified air defense facilities. It was the duty of these organizations to furnish flight plan information no sooner

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9. History of EADF, 1 Jan-30 Jun 1951, p. 208.

than fifteen minutes and no later than five minutes prior to the estimated time of arrival (ETA) of aircraft at each check point. They were also to transmit revised flight plan information to the air defense facilities whenever reports were received that previously filed ETAs were in error more than five minutes or when the track of the flight varied more than twenty miles from that specified in the original flight plan.[10] During the air defense exercise in June 1951, flight plan correlation in the 32nd Air Division using the Boston AMIS reached a high of 93.8%; the 26th and 30th Air Divisions, which were not assisted by an AMIS, averaged 69 and 60.5%, respectively.[11]

The Boston and Seattle AMISs proved so successful that ADC suggested these two be retained on a permanent basis and that additional AMISs be employed in other areas.[12] Studies were conducted by the air divisions and air defense forces to determine specific areas within or adjacent to which AMISs would prove most valuable, and the results were forwarded to USAF with a request that funds be

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10. ADC Memo, "Interim AMIS Standard," 4 Dec 1951 (DOC 104).

11. Hq EADF, "EADF Report of Air Defense Exercise, 22-24 Jun 1951," 23 Aug 1951.

12. ADC to USAF, "Requirements for Air Movements Information Sections," 26 Sep 1951 (DOC 105). At the request of ADC the nomenclature of AMIS was changed to Air Movements Information Section.

provided to establish these organizations.[13] While budgetary difficulties prevented USAF from taking immediate action to grant this request,[14] that headquarters authorized ADC to coordinate an overall AMIS program with CAA in order that implementation might be commenced by 1 July 1952.[15] In the interim, ADC arranged for the CAA to provide security controllers to forward pertinent information to the air defense system. Additionally, ADC suggested to its Canadian counterpart that AMISs be established in certain Canadian Air Route Traffic Control Centers for the purpose of providing filtered flight plan information directly to certain U. S. radar stations. The Canadians agreed to look into this matter, and to determine the feasibility of setting up several AMISs along the U. S. Canadian border.[16]

In spite of the fact that the air defense system received flight plans on all air traffic within ADIZs, it was still unable

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13. The establishment of AMISs was requested by ADC on a priority basis which coincided with the current and projected status of AC&W facilities. The following priority was requested in establishing additional ADIZs: First Priority - (1) Seattle ADIZ, (2) Bangor ADIZ, (3) San Francisco ADIZ, (4) Los Angeles ADIZ, (5) Albuquerque ADIZ, (6) Minneapolis ADIZ, (7) Atlantic Coastal ADIZ, (8) Pacific Coastal ADIZ. Second Priority - (1) Great Falls ADIZ, (2) Traverse City ADIZ, (3) Knoxville ADIZ.

14. TWX, ADC to USAF, 29 Mar 1952 (DOC 106).

15. TWX, ADC to EADF, CADF, WADF, 14 Apr 1952 (DOC 107).

16. Agenda of Air Defense Commanders Conference, 23-24 Jan 1952, Tab XVII (DOC 108).

to identify all aircraft in these zones. In certain sectors within the ADIZs, such a large amount of air traffic was generated that the task of correlating and pre-plotting flight plans was too great. Consequently, in sectors of certain ADIZs where this condition prevailed, ADC established "free areas." Aircraft initially detected within the limits of these "free areas" were to be categorized as friendly regardless of altitude.[17] In this manner, ADC conceded that identification of aircraft by the method of flight plan correlation was impractical in areas of extremely high traffic density. The "free area" principle, accordingly, was considered a calculated risk. On the other hand, ADC had no intention of permitting the indiscriminate use of the principle. It directed that these areas be reduced to as small a size as possible, and had the defense forces submit justification, in study-form, for all "free areas" established. One such study contained numerous reservations to the "free area" idea but concluded that ". . . it has cut the identification requirement by more than half since its establishment."[18]

At the end of 1951, ADC was still experimenting with the "free area" concept as a temporary expedient in the 25th, 27th and 28th Air Divisions.[19] The concept was to apply only to peacetime

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17. 27 AD study of "Free Area," [circa Apr 1951] (DOC 109).

18. As in fn 17.

19. History of WADF, 1 Jan-30 Jun 1951, p. 70.

operations, of course; in the event of imminent hostile air attack, it would be abandoned in favor of more stringent control procedures. There were discrepancies between the civilian and military regulations for air traffic control which required ADC's attention during 1951.[20] For example, the CAA had established procedures and provided full legal authority to discipline civilian pilots for certain violations in flying within ADIZs.[21] Since military pilots constituted a high percentage of those who violated provisions laid down in CAA 620 but which were not covered by AFR 60-22, there was a need to bring the two regulations more in line with one another.

The original version of AFR 60-22 had not required military pilots to file flight plans for operations within ADIZs so long as they arranged such flights with local air defense commanders.[22] This imposed such identification difficulties on the air defense system that the revised version of AFR 60-22 required the air division commander to approve all such operations in the future.[23] Even after this change, the problem continued; the fact that local flying was put into a special category by the regulation led airmen to believe

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20. Part 620 of the CAA Regulations was based on the Civil Aeronautics Act of 1938 and Executive Order 10197.

21. CAA Legal Policy Directive No. 29, 19 Feb 1951 (DOC 110).

22. See ADCHR #1, p. 329.

23. As in fn 22.

that the requirements for reporting this type of flying were less stringent.[24] Obviously, this was not true because the air division commander was still responsible for identifying all aircraft operating within his ADIZs. In an effort to tighten up on local flying within ADIZs the recommendation was made that local flying as a special category within AFR 60-22 be deleted.[25]

EADF also had many pertinent objections to the basic concepts of AFR 60-22. That headquarters felt that the artificial categories between domestic, coastal and international boundary ADIZs should be eliminated, and that the flight rules in all ADIZs should be identical regardless of their location. This would eliminate the artificial distinction made between domestic ADIZs which started at 4,000 feet altitude and permit flights without flight plans at lower altitudes, and in coastal ADIZs which started at the ocean's surface. In other words, EADF wished to establish an ADIZ from the ground up, rather than to permit flights at 4,000 feet and below without submission of flight plans.[26]

After soliciting comments from the defense forces on proposed

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24. History of EADF, 1 Jan-30 Jun 1951, p. 221.

25. Ist Ind., EADF to ADC, 26 Jun 1951, to ADC to EADF, "Regulations of the Administrator, Part 620, Regarding Military Pilots," 2 Jun 1951 (DOC 111).

26. As in fn 25.

changes to AFR 60-22, ADC revised the regulation.[27] The changes desired by EADF for ADIZs starting from the ground up were not included, nor was the special category of local flying deleted from the revised version of the regulation. However, rules and procedures for military aircraft operating within ADIZs were laid down, and adherence to flight plans and reporting procedures by such aircraft was required.[28] If approved, the regulation was to be used as a basis for revising Part 620 of the CAA regulations so that the civil and military regulations on air traffic would conform. Perhaps the most significant change in the revised regulation was the section devoted to the control of air traffic during a military emergency. A discussion of this topic is reserved for another section in the chapter. It should be noted, however, that the revised regulation was still awaiting approval by higher headquarters at the end of 1951.[29]

Because it did not consider ". . . the present system of flight plan correlation . . . an adequate means of identifying aircraft penetrating the continental boundaries of the United States from foreign ports . . .,"[30] ADC was experimenting with a multiple corridor identifi-

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27. 2d Ind., WADF to ADC, 17 Jul 1951, to WADF to ADC, "Civil Air Regulation 620 Violations Regarding Military Pilots," 16 May 1951 (DOC 112). Ist Ind., CADF to ADC, 14 Jun 1951, to ADC to CADF, "Regulations of the Administrator, Part 620, Regarding Military Pilots," 2 Jun 1951 (DOC 113).

28. ADC to USAF, "Proposed Revision of AFR 60-22 and Civil Air Regulation 620," 26 Oct 1951 and inclosure (DOC 114).

29. USAF to ADC, "Proposed Revision of AFR 60-22 and Civil Air Regulations Part 620," 13 Nov 1951 (DOC 115).

30. ADC to EADF, "Identification of Aircraft Entering the United States," 23 Oct 1951 (DOC 116)

cation system. This system was designed to reduce to a minimum the proportion of friendly flights classified as unknown on incoming overseas flights because friendly pilots were not able to make good (within prescribed tolerances) their course and time estimates listed on their flight plans. The system was also designed to reduce to a minimum the probability that a hostile aircraft would enter into the defense system by being mistaken as friendly.[31]

The multiple corridor test was given a trial in the 28th Air Division area during March 1952. The test, designated as Operation Porpoise, indicated that the combination of a briefed corridor penetration, voice code and prescribed maneuver was an improvement over any other means of identifying over-water flights. Out of a preliminary sampling of 66 flights inbound from Hawaii to the San Francisco area, 35% missed the corridors to which they had been assigned and 4.5% missed their

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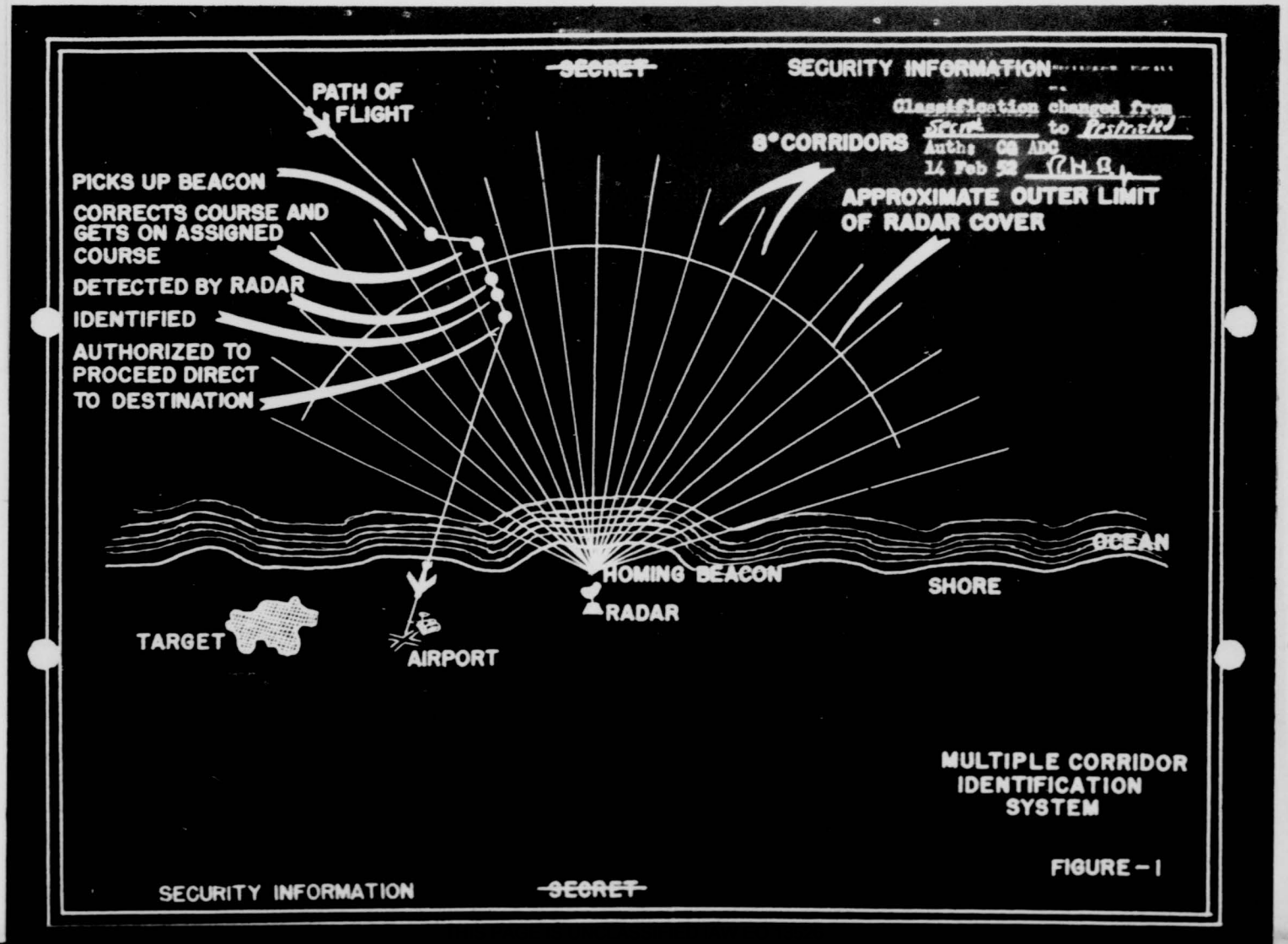
31. The proposed system required all aircraft intending to penetrate the boundaries of the United States from the north, east and west to enter at predetermined points. Certain points of penetration would be established along the borders of the U. S. and each point would be marked by a non-directional radio beacon. The pilot of the penetrating aircraft would be assigned a corridor for penetration, a course unique to his flight which he would follow upon picking up the beacon. Some deviation from the estimated time of arrival and direction to the corridor would be permitted. If the aircraft arrived within these prescribed tolerances it would be recognized as friendly and allowed to come in on the beacon as such. If the aircraft failed to arrive within the prescribed recognition tolerances at the point of penetration, it would be challenged by radio and also required to perform a preassigned maneuver. If it passed these identification tests, it would be recognized as friendly. If, however, it did not enter by means of the proper corridor, failed to answer the voice code by radio, or did not perform the prescribed maneuver as designated, it would be identified as an unknown and interceptors would be scrambled. (See, Ops. Analysis Tech. Memo No. 3, 13 Mar 52 (DOC 117) See also: ADC to WADF, "Test of Multiple Corridor Identification," 15 Feb 52 (DOC 118)



ETAs, but none of these aircraft missed the authenticating code and none missed the prescribed maneuver.[32]

III

Immediately upon the outbreak of hostilities, or when war appeared imminent, strict traffic control procedures would have to be placed into effect. All civil and military flying not essential to the prosecution of the war, of course, would be forbidden. Most important, all essential friendly flying would have to be so closely monitored that it would not interpose undue burden on the air defense system for dispatching interceptors for identification. In planning for this emergency condition, ConAC and later ADC frequently clashed head-on with the CAA, with the other USAF agencies and with the Navy. The problem appeared to be: How to permit ADC the control it would require over friendly air movements during periods of emergency and, at the same time, not place unnecessary restrictions on air movements which the civil and other military agencies considered vital to their operations.

The services of the CAA were early solicited in the prepara-

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32. Hqs ADC, Ops Analysis Tech. Memo. No. 4, 17 Sep 1951 (DOC 119). In an effort to evaluate some aspects of the flight plan correlation method, ADC conducted an air traffic control test in the Albuquerque area in July 1951. The conclusions reached were: ". . . that flight identification is at present unwieldy and subject to considerable error. It is a system which identifies as friendly only about 70% of the friendly aircraft flying in this country." Since flight plan identification was the only system of identification available at the present time, it was recommended that every possible step be taken to improve the system, and every avenue explored to find new and better methods of identification.

tion of plans for the control of civil air traffic during these conditions. In April 1949, the plan titled, "A Plan for the Security Control of Civil Air Traffic" was approved by the Chief of Staff, USAF, and the Civil Aeronautics Administrator and published. Since this was the first act taken to prepare for the emergency control of friendly air traffic, it was naturally deficient in many areas. Its most glaring fault was that it provided only for control of civil air traffic, making no provisions for control of what could be expected to be large military air activities. To continue work on the matter, a Joint CAA-USAF Air Defense Planning Board was established in mid-1950. By March 1951, this organization had completed a more complete plan for emergency control of air traffic termed the Interim Joint Plan. Backed up by Public Law 778, this directive provided for the control of all air traffic in an emergency, military as well as civilian.[33]

No sooner was this plan implemented than its basic concept was questioned. The plan called for the establishment of ADIZs over most of the United States and limited ADC's control over air traffic to these zones. Experience in operating with ADIZs had made this concept debatable. A better plan, it was felt, would be to reduce the planned number of ADIZs, to establish them only on the boundaries of the nation and about critical target areas, but at the same time give ADC control over air traffic anywhere in the United States

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33. See ADCHR #1, ch. xiv.

during conditions of Red and Yellow alert. ADC, of course, was anticipating a situation where an air defense battle would be fought within an area which had not been designated as a domestic ADIZ at the time of the emergency, in which case it would have no control over friendly air traffic in that area.[34] When this objection was considered by the Joint CAA-USAF Air Defense Planning Board, the CAA registered its objections to granting ADC what in effect was authority to impose air traffic control throughout the U. S., if necessary, during an emergency.[35]

In October 1951, the CAA firmed up its thinking on the matter in a plan calling for the limitation of the areas over which ADC and its subordinate organizations would have control of air traffic in an emergency. This plan divided the U. S, into three areas -- ADIZs, Military Emergency Security Areas, and other areas.[36] CAA recommended

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34. Briefing for the Civilian Aviation Advisory Board, 9 Jan 1952 (DOC 120). Another questionable area in the Interim Joint Plan, from ADC's point of view, was the provision resolving aircraft operating within domestic ADIZs below 4,000 feet of the responsibility of filing flight plans. Quite often radar operators could not determine whether aircraft approaching a critical area were flying above or below this level, resulting in numerous interceptions for visual identification. During an emergency, such needless interceptions would drain the interception capability tremendously.

35. Memo, Bergquist to Chidlaw, "Plan for the Security Control of Air Traffic During a Military Emergency," [circa Nov 1951] (DOC 121).

36. Hq USAF, "Plan for the Security Control of Air Traffic During a Military Emergency," a draft prepared by the CAA, 16 Oct 1951 (DOC 122).

that separate sets of rules for flight in each of these areas be imposed under various conditions of alert. Implementation of this plan would have deprived the air division commanders of the authority to ground, restrict, or divert air traffic as necessary within their areas of responsibility. While the situation might never arise whereby emergency air traffic control would be implemented throughout an entire division area, ADC felt that authority to impose such restrictions was necessary.

In early 1952, the Joint CAA-USAF Air Defense Planning Board drafted the "Plan for the Security Control of Air Traffic During a Military Emergency," to which the short title of SCAT was applied. In it was sought the solution to the problem of allowing a maximum amount of air traffic during an emergency without depriving ADC of adequate control over this traffic.[37] This plan, to be placed into effect as soon as a military emergency were declared,[38] outlined in detail the sequence of actions to take place at this time both within and outside of ADIZs under White, Yellow, and Red warning conditions.

Depending on the requirements prescribed by the air division commander, the CAA Regional Administrator, by the terms of this plan,

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37. Joint CAA-USAF Publication (Draft), "Plan for the Security Control of Air Traffic During a Military Emergency," 3 Jan 1952 (DOC 123).

38. A military emergency was defined as follows: (1) A Presidential proclamation and/or Congressional declaration of war; (2) a directive issued by the Joint Chiefs of Staff; (3) a declaration of emergency by the Commanding General of ADC: and (4) when an actual hostile attack was made on targets within the continental U. S.

could direct all civil traffic within ADIZs during conditions of warning White as follows: (1) to file flight plans for all point-to-point flights regardless of altitude and to maintain, by two-way radio, continuous communication to insure the reception of any additional instructions which might be issued;[39] (2) to limit all point-to-point air traffic to the capacity of the air defense system to effectively identify air traffic;[40] (3) to confine all air traffic to approved flight corridors and to require that position reports be made over specified reporting points within these corridors;[41] (4) to restrict all local air traffic to designated local flying areas or, if no such area had been designated, to impose severe limitations on local flights;[42] and (5) to direct all air traffic

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39. It was specifically indicated that agricultural and industrial aircraft movements might be exempted from the compliance with the two-way radio requirement while moving to a new base of operations.

40. Under these circumstances a priority listing developed by the Defense Air Transportation Administration and the Department of Defense would be used in adjusting the quantity of air traffic to the capacity of the air defense system to effectively identify.

41. The position reports would be made to an appropriate CAA facility or other established communications facilities. The use of position reports and flight corridors would considerably improve the identification capabilities of the air defense system.

42. The categories of flights to which this provision would apply included operations such as training flights, crop dusting operations, and local industrial flights. Under these conditions the aircraft need not necessarily be equipped with a two-way radio but might be required to possess some means for visual recall. If no local flying area were designated, local flights might be restricted to within ten miles of take-off point and to an altitude of not more than 20,000 feet.

entering the United States through international boundary or coastal ADIZs to land first at a clearing point outside the country where pilots would be briefed, assigned authentication codes, and provided with specific identification and approach procedures, before being cleared for take-off on the entry flight.

The restrictions to be imposed on aircraft operating outside ADIZs during a warning White condition differed from those enumerated above. Depending upon the requirements prescribed by the air division commander, the CAA Regional Administrator could confirm point-to-point flights outside ADIZs during a condition of warning White if they met the following conditions: (1) were so equipped that the pilot could maintain a listening watch on appropriate frequencies to insure the reception of and compliance with security instructions which might be issued; (2) were confined to altitudes and time limits prescribed by the air division commander; and (3) were conducted in such a manner that they could be recalled by visual means within the time limit prescribed by the air division commander. Regardless of whether a flight was conducted within or outside of ADIZs, Regional Administrators could divert and control air traffic at any time to permit the immediate take-off and employment of military aircraft engaged in combat operations.

During a warning Red condition, the emergency controls over air traffic were considerably broadened. In accordance with the requirements of the air division commander, the Regional Administrator

could (1) ground all aircraft under extreme circumstances except those flights ordered by or coordinated with the air division commander,[43] (2) direct all in-flight air traffic around the affected areas, regardless of whether it was in an ADIZ or not, to land at the nearest airport if possible, or to take a course away from the route or point of attack, and (3) place into effect established controls for electromagnetic radiations as directed by the air division commander.[44]

During a warning Yellow condition, CAA Regional Administrators could impose any or all of the restrictions listed for warning Red. Any controls imposed upon air traffic during a warning Yellow condition would depend upon local conditions and the degree of security control considered necessary by the air division commander.

The SCAT plan had reached the final stages of coordination between USAF and the CAA and was ready for submission to the Secretary of Defense and the Secretary of Commerce for approval at the time the history was completed. The plan gave promise of being the most satisfactory solution to date to the very important problem of keeping the sky clear for air defense battle in an emergency.

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44. This would involve shutting down most air navigation radio aids in the area. However, certain key aids would remain in operation for sufficient time to permit the diversion or landing of friendly aircraft which might be operating in the area when a warning Red was declared.

IV

The acquisition of Mark X IFF equipment, especially the ground component of this equipment, remained a slow and very critical matter during the latter half of 1951.[45] For the most part, the Mark X IFF equipment assigned could be used only in a beacon capacity to assist in the controlling of interceptors operating at long ranges or in overcasts.[46] The status of the program to provide the air defense system with this electronic means of effecting identification was summarized by one specialist as follows: "The IFF is a very, very bad picture. Parts of it are ready, but the high-powered equipment part is very, very sad."[47]

By mid-October 1951, only eleven radar sites had been equipped with ground (Interrogator-Responsors, I-Rs) Mark X IFF equipment.[48] Of these, only four were new, the others being those inherited from ConAC on 1 January 1951. The possibility of receiving additional

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45. For a detailed account of the need for IFF equipment and of the action taken by Hq ADC to secure this equipment during the first half of 1951 see ADCHR #1, pp. 380-388.

46. Mark X IFF airborne equipment emits a beacon which registers on the PPI scope of search radar sets to distances up to 200 miles. This beacon-assist function enables controllers to vector interceptors which ordinarily would either be out of range of their radar sets or would be too small to appear on the scope.

47. Col. G. G. Getz, Hq AMC, at ADC Com. Conf., Oct 1951.

48. Memo, Maj. G. E. Marak to Col. H. E. Neal, Director of Communications, Hq ADC, "Mark X IFF Status (Present and Future)," 19 Oct 1951 (DOC 124).

equipment of this type in the immediate future appeared unlikely.[49] ADC's efforts to seek correction of this bleak condition were limited to authorizing a series of experimental projects with regard to modifying the airborne AN/APX-6 Mark X IFF transpondor for use as ground I-R[50] and to planning for the placement of I-R equipment when it became available.[51]

The status of airborne Mark X IFF equipment supply was improving. Almost all of the F-86, F-89, and F-94 aircraft were being delivered from the factory with AN/APX-6 equipment installed. Also, AMC had taken action to step up the retrofit program for this equipment by arranging for civilian installation teams to install AN/APX-6s in almost all USAF aircraft,[52] this program to be completed sometime around November 1952.[53] By late 1951, approximately 41% of ADC's assigned aircraft carried this equipment.[54]

A reason why the limited Mark X IFF equipment assigned could not be utilized for identification to any great extent was that it

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49. As in fn 48.

50. ADC to CADF, "Temporary IFF Ground Interrogators," 9 Apr 1952 (DOC 125).

51. Memo, "IFF Mark X Program," (DOC 126).

52. ADC to EADF, "Retrofit Program for AN/APX-6 in Air Defense Command Aircraft," 4 Mar 1952 (DOC 127). See also: AMC to ADC, "Installation of AN/APX-6 in USAF Aircraft," 19 Mar 1952 (DOC 128).

53. ADC to EADF, "Retrofit Program for AN/APX-6 in Air Defense Command Aircraft," 15 Apr 1952 (DOC 129). See also: TWX, AMC to ADC, 21 Feb 1952 (DOC 130).

54. See ADCHR #1, p. 385.

was restricted to only four modes of recognition. This did not allow sufficient variation in coded signal to provide genuine security. Since it must be assumed that this equipment, like the Mark III IFF during World War II, will fall into the hands of the enemy during any subsequent conflict, these four modes of recognition would be quickly compromised. Consequently, USAF has been hard at work on the development of an automatic coding device, termed the selective identification feature (SIF),[55] which will (1) provide a greater number of codes, and (2) permit a change of codes within a short period.[56]

Since Mark X IFF will be used by all the services, the adoption of any additional features such as SIF had to have the approval of the Joint Chiefs of Staff. As a result, the Air Force SIF coding device was thrown into competition with a coding device devised by the Navy called the pulse training coding (PTC).[57] The principal

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55. This equipment was formerly termed Short Interval Identification System (SIIS).

56. Memo, USAF, "Military Characteristics for a Selective Identification Feature for Mark X IFF," 7 Nov 1951 (DOC 131). Under the proposed SIF system more codes would be provided as follows: on Mode I there would be thirty combinations of code for the universal identification of all friendly aircraft, and on Mode II there would be 400 combinations of code for establishing the identity of individual aircraft. It would provide a rapid change in codes by automatically changing codes at one minute intervals. This spread of code combinations and rapid changes in code combination would make it difficult for the enemy to anticipate which codes were to be used even if the Mark X IFF equipment were in his possession.

57. Memo, Maj. Marak to Col. Neal, "Brief on the Navy Pulse Training Coding (PTC) and the USAF-SII System," 4 Dec 1951 (DOC 132).

differences between the two features was that the Navy PTC was manually operated while the USAF SIF was automatic. Too, the Navy device did not provide as many combinations of codes as the USAF SIF.[58]

The Navy insisted on the immediate adoption of its manual PTC code changer, proposing that it could serve as an interim system until the USAF automatic code device could be thoroughly tested and evaluated. USAF assumed the position that the manual code changer of the Navy PTC did not offer enough additional security for the basic Mark X IFF equipment to justify its acceptance.[59]

At the end of 1951, the Navy and the Air Force were still not agreed as to which coding device should be adopted. After a demonstration of the USAF SIF equipment at Eglin Field in December, EADF observers recommended that the features incorporated in this equipment be adopted for purposes of air defense. ADC was in complete accord with this recommendation.[60]

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58. On Mode II, the Navy PTC provides on 30 combinations of codes for personal identification of individual aircraft as compared to the 400 code combinations for this purpose in the USAF SIF. Moreover, the pilot in the fighter aircraft is unable to change his IFF code in the Navy PTC device once airborne, thus reducing the possibilities of security.

59. USAF to ADC, "Operational Suitability Test of the IFF Mark X Short Interval Identification System," 31 Aug 1951 (DOC 133).

60. EADF to ADC, "Mark X IFF," 28 Dec 1951 (DOC 134).

V

Considering the difficulty of effecting identification via the correlation of flight plan data method, and the shortages and unreliability of IFF equipment, it was to be expected that the percentage of "unknown" tracks penetrating the air defense system would remain high during the latter half of 1951. Interception for visual recognition remained ADC's only recourse for attempting to reduce this figure.[61] The deficiencies in this procedure, discussed in some detail in the previous history,[62] were related to the major deficiencies in the air defense system as a whole - radar and interceptor equipment shortcomings, faulty control proceedings, etc. Since these matters will be discussed at greater length in a subsequent chapter,[63] suffice it to say here that ADC was able to identify less than 25% of the unknowns penetrating the system during the last half of 1951, as the following statistical resume of intercept operations reveals:[64]

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61. For an account of interception for identification proceedings see the following: ADCR 55-9, "Identification Procedures and Rules of Engagement for Interceptors in Air Defense," 17 Apr 1952 (DOC 135); EADF SOP 60-2, "Interception Procedures and Rules of Engagement - Active Air Defense," 24 Oct 1951 (DOC 136).

62. See ADCHR #1, ch. xvii.

63. See ch. vii, following.

64. ADC Command Data Book, Jan 1952 (Supplementary App. DOC S-2).

	Jul	Aug	Sep	Oct	Nov	Dec
Unknown Tracks	1950	2021	3258	1473	1296	1485
Intercept Attempts	1063	782	1480	761	794	826
Successful Intercepts	575	398	645	317	416	381

Day-intercept procedures for making identification of transport or cargo type aircraft were firmed up during the latter half of 1951. As in graphically portrayed in the chart which follows, interceptors, in closing for making identification, were to pass across the bow of the unknown aircraft, thereby informing the pilot that he was under surveillance. The primary intent of the directive was, of course, to increase safety, both for the aircraft under identification and for the interceptor.[65]

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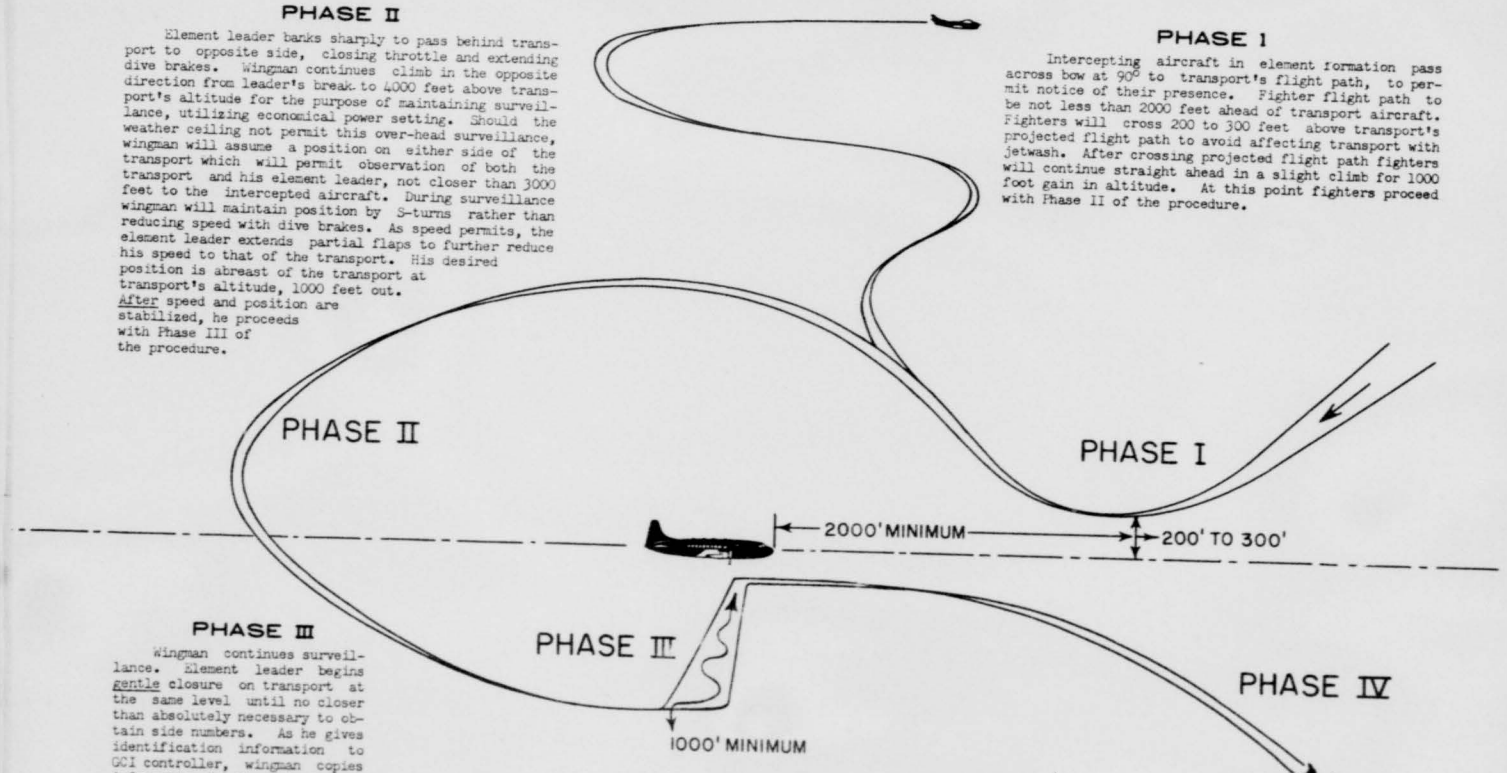
65. ADCR 55-21, "Day-Intercept Procedures for Identification of Transport/Cargo Type Aircraft," 15 Oct 1951 (DOC 137).

PHASE II

Element leader banks sharply to pass behind transport to opposite side, closing throttle and extending dive brakes. Wingman continues climb in the opposite direction from leader's break to 4000 feet above transport's altitude for the purpose of maintaining surveillance, utilizing economical power setting. Should the weather ceiling not permit this over-head surveillance, wingman will assume a position on either side of the transport which will permit observation of both the transport and his element leader, not closer than 3000 feet to the intercepted aircraft. During surveillance wingman will maintain position by S-turns rather than reducing speed with dive brakes. As speed permits, the element leader extends partial flaps to further reduce his speed to that of the transport. His desired position is abreast of the transport at transport's altitude, 1000 feet out. After speed and position are stabilized, he proceeds with Phase III of the procedure.

PHASE I

Intercepting aircraft in element formation pass across bow at 90° to transport's flight path, to permit notice of their presence. Fighter flight path to be not less than 2000 feet ahead of transport aircraft. Fighters will cross 200 to 300 feet above transport's projected flight path to avoid affecting transport with jetwash. After crossing projected flight path fighters will continue straight ahead in a slight climb for 1000 foot gain in altitude. At this point fighters proceed with Phase II of the procedure.



PHASE III

Wingman continues surveillance. Element leader begins gentle closure on transport at the same level until no closer than absolutely necessary to obtain side numbers. As he gives identification information to GCI controller, wingman copies information for the mission report. Element leader uses every precaution to avoid startling transport crew or passengers. Upon completion of identification, the fighters withdraw from transport vicinity as outlined in Phase IV.

INTERCEPTION PATTERN FOR IDENTIFICATION OF TRANSPORT AIRCRAFT

PHASE IV

Element leader breaks gently away from transport, in shallow dive to pick up speed. Wingman stays well clear of transport and proceeds to join leader.

CHAPTER SEVEN

OPERATIONS

I

During 1951, efforts to firm ground-controlled interception (GCI) techniques and other operational proceedings were intensified. Since the 75 radar stations of the Permanent radar system were scheduled for completion by early 1952, harmonization of tactical procedures throughout the command was necessary in order to assure full utilization of the capabilities of the new radar. Early in the year, ADC Headquarters requested that all publications of the air defense forces and air divisions governing GCI operations be forwarded for study. The attempt was then made to gauge their adequacy by applying them to a hypothetical air defense situation.[1] This collation supported what was already well-suspected - that such procedures differed considerably on each major element of operations.[2]

An important outcome of this evaluation was the publication of a stream of ADC regulations, late in 1951 and early in 1952, governing the definition of terms and the establishment of standard

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1. ADC Com. Conf., Feb 1951 (DOC 138).

2. On the inconsistency of air defense terminology in use in ADC see the presentation of CADF in ADC Com. Conf., Oct 1951, pp. 44 ff.

operating procedures.[3] This attempt to crystallize the experiences of the previous three years of interim operations was greatly aided by the reorganization of the unit structure which took place early in 1952.[4]

In this concluding chapter, certain major problem areas in air defense operations - as revealed in the reports of day-to-day systems operations, the critiques of periodic exercises, and the analyses of the occasional system alerts - are treated. Some of these problems, especially those caused by equipment inadequacies, ADC was and ever will be unable to resolve. Others, such as that of coordination between sectors for the passing of information, etc., ADC could and did resolve through the processes of experimentation and the application of efficient management principles. Subjects discussed in the following pages, and in this order, are as follows: radar systems operations, the command network, scrambles, and control procedures.

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3. For example: ADC Manual 50-3, "Organization and Functions for Air Defense," 15 Sep 1951 (DOC 139); ADCR 55-27, "Fighter-Interceptor Squadron Standard Operating Procedures," 21 Dec 1951 (DOC 140); ADCR 55-19, "Unknown Aircraft Report," 19 Oct 1951 (DOC 141); ADCR 55-30, "Control Procedures: Fighter-Interceptor Aircraft," 26 Mar 1952 (DOC 142); ADCR 55-29, "Air Surveillance Procedures," 24 Mar 1952 (DOC 143); ADC Manual (Tentative), "Tactics and Techniques Doctrine for Interceptor Squadrons in Air Defense," 18 Apr 1952. This last-mentioned manual was still in draft form at the time of this writing, pending incorporation of suggested changes from the field. For information on routine training procedures for ADC fighter units, see the following: ADC Unit Proficiency Directive 10-1, Dec 1951 (DOC 144); ADC Unit Proficiency Directive 10-2, Dec 1951 (DOC 145).

4. See ch. v, above.

II

Perhaps the most important factor in the progress of air defense operations in 1951 was, as has been told previously, the emergence of the Permanent radar system.[5] By the end of that year, the majority of the new stations were operational, though many were limited in their operation. Although the capability of the new radar equipment was anticipated through arduous monitoring of the progress of development and through factory tests, much more was learned by actual operation of the equipment as part of the radar net.

In estimating the role the new equipment was to play in air defense, difficulties were encountered because of the continuing existence of a number of LASHUP sites and considerable LASHUP radar equipment. The difficulty was aggravated by the continuous changes which took place as LASHUP stations were phased out and Permanent or LP stations took their place. In spite of the transitional state of radar equipment and deployment of early 1952, the pattern of capability of the Permanent system was clearly emerging.

A prime requirement, now that the radar system was in a state of "overhaul," was that of clearly designating the areas of surveillance and operation, and the functions of each of the radar installations. Although the Permanent system was originally conceived as consisting

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5. See ch. ii, above.

of a network of GCI stations, the chronic shortage of qualified controller-directors[6] and lags in the delivery of height-finding equipment (as well as new concepts of area control) forced a change in plans. One master GCI station in each sub-sector of a divisional area was designated as an Air Defense Direction Center (ADDC).[7] Generally, the formula for selection of these stations was whether they possessed the AN/CPS-6B radar equipment, whose virtue in this respect was the fact that a height-finder was an integral part of the equipment.[8]

The specific functions of the two basic types of radar installations - the Early-Warning stations and the Direction Centers - were laid down in ADC's Manual 50-3, published in September 1951.[9] Essentially the difference between the two was that the former was to perform only surveillance functions unless directed otherwise, while the Direction Centers were to perform both surveillance and

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6. Originally the word "controller" was applied to both the fighter controller at a GCI station and to the controller of the Air Defense Control Center. ADC Manual 50-3 established the word "director" for the fighter director at the ADDC and retained the word "controller" for the functionary of the ADCC. In popular usage, however, the word "controller" as applied to the ADDC was an unconscionably long time in dying.

7. The expression "Master GCI" was in frequent usage before the expression "Air Defense Direction Center" became official.

8. On the AN/CPS-6B, see ADC, Communications and Electronics Digest, Jun 1951.

9. ADC Manual 50-3, "Organization and Functions for Air Defense," 15 Sep 1951 (DOC 139).

control functions.[10] In addition to delineating the functions of the different radar equipments, it was also necessary that each radar have its clearly delineated area of responsibility. To this end, the air divisions were required to establish sub-sectors within their sectors, each of the former to be under the direction of an ADDC.

The redefinition of territorial sub-sectors and the firming of the concept of an Air Defense Direction Center reawakened a controversy which had been latent since the establishment of an air defense system, namely, whether the proper tendency in air defense operations was toward decentralization of control or toward centralized control of the air battle in either the Direction Center or the Control Center.[11] Although controversy was rife, the factors which might have made an effective centralization of control in the hands of the ADCC or the

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10. In reality, three types of radar installations were distinguished in ADC Manual 50-3: the EW station, the GCI, and the ADDC. Thus, on the GCI the Manual had the following to say: "The essential elements of this type of installation are the functions of surveillance and air-intercept control. Normally it will not be responsible for the commitment of forces for air defense, but may be organized and manned to provide for the extension of functions delegated by the ADCC or ADDC to which it is operationally responsible." (Underlining added). /See Amendment, 19 Nov 1951, to ADC Manual 50-3 (DOC 139)7

11. See IRS, O&T to Staff, "Centralized Control of Air Defense Weapons," 4 Jan 1952, for a view favoring the ADCC, and WADF to 25AD, "Decentralization in Air Defense Operations," 14 Sep 1950 (DOC 146). for arguments in behalf of the ADDC.

regional COC were as yet in the development stage.[12] In the meantime, it was a foregone conclusion that, lacking this capability, the higher echelons of command would have to relinquish the control of the local air battle to the Direction Center.[13]

Where the radar coverage of the Permanent system deployment could be evaluated as the equipment became operational, the attitude of the air divisions was generally favorable. The 25th Air Division, for example, stated that the ". . . effectiveness of the overall deployment of the permanent radar sites, the technical efficiency of the AN/FPS-3 and the operational alignment of radars in the division sector indicated the /good/ judgment of those responsible for the

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12. It was estimated that certain projects in the development stage at present, such as the British CDS system, and "WHIRLWIND II," by allowing a more timely and accurate air situation picture to be presented to higher authority, would favor centralization in the latter. A discussion of the CDS and WHIRLWIND II systems must await further development of these projects before adequate historical expression is possible.

13. The increased stature of the Air Defense Direction Center in ADC thinking was expressed in a presentation made by General Vincent before the ADC Commanders Conference at Hamilton AFB, in Mar 1952. After stating that ". . . the current concept of decentralizing authority and action responsibility to the Direction Center is sound, in light of the delay inherent in the system in getting the information to the controller . . ." he recommended an increase in rank for the Direction Center personnel commensurate with the importance of their duties and responsibilities. /ADC Com. Conf., Mar 1952 (Extract included herein as (DOC 147)/.

establishment of these phases of air defense in this area."[14] Praise for the performance of the new AN/FPS-3 search radar was generally high, although it was the consensus that the AN/CPS-6B set, though efficient when fully manned by skilled personnel, was troublesome in that it required painstaking maintenance and supply efforts.[15]

Although the new equipment proved to be considerably better than that used in the LASHUP net, the shortcomings of the new radar were very real. The ability of the search radar to detect at altitudes below 10,000 feet was negligible, as was continuously proven in the exercises held in late 1951 and early 1952. Furthermore, great difficulties were encountered by scope observers in detecting single jet interceptors, or even jet bombers of the B-45 type. With the inception of the Mark X IFF system, it was believed that the problem of detecting ADCs own interceptors would be overcome.[16] As for the difficulty in detecting larger type jet aircraft, additional training in scope readying was proposed as a temporary cure for this defi-

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14. 25AD, "Operations Summary Report of WADF Exercise 16-51," 25 Jan 1952, p. 17. The 34th AD, however, believed that the coverage afforded by the Permanent radars in its area left much to be desired. ADC indicated that deficiencies would be removed when additional sites of the Mobile program were provided in this sector. /See WADF to ADC, "Evaluation of Air Defense Exercise Conducted at 34th AD, 22 May 1951," 6 Jul 1951 (DOC 148)/

15. On maintenance of radar equipment see (Subj: Unclassified) ADC Quarterly Report to USAF, Mar 1952. TOP SECRET.

ciency.[17]

The exercises mentioned proved that, in general, the detection of bombers was related to the calibrated coverage of the new stations, although sometimes greater ranges than those calibrated were accomplished. However, there existed a serious deficiency in altitude determination. This was due in large measure to the lag in production and delivery of the new height-finding radar which could provide the altitude information for the AN/FPS-3 radars.[18] In the meantime, LASHUP height-finders were woefully deficient in number and quality as substitutes. In Operation HOTROD, held in the EADF region in the fall of 1951, only one station in the entire 26th Division sector was capable of providing valuable altitude information.[19]

The ability of the new radar equipment to track bomber-type aircraft continuously was considered very good, with the annoying exception that in areas of dense traffic, as for example between New York and Washington, D. C., tracks were frequently lost.[20] It was believed, however, that with the implementation of emergency control of air traffic proceedings, tracking would be possible throughout the

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17. See EADF Operations and Critique Report, "Exercise HOTROD," 18-19 Nov 1951, p. 40 (hereinafter referred to as HOTROD).

18. On Height-finders for the new search radars, see ADCHR #1, ch. v.

19. As in fn 17, p. 72.

20. As in fn 17, p. 42.

radar coverage. In the meantime the problem was very real. Two techniques were suggested which might minimize it: One was the use of dead-reckoning procedures to estimate the position of the target aircraft in the dead area; the other was the use of trailer aircraft to follow the bomber into the high-density area. Dead-reckoning as used by the directors was generally very useful in overcoming this deficiency, except that in some instances the wrong aircraft was tracked out.[21] Trailer aircraft were not generally employed in air defense late in 1951, although plans were laid for the use of conventional fighters for this purpose.

The lack of altitude information was especially felt in night and foul weather operations. Although azimuth headings were quite helpful in daylight operations, where the pilot could employ visual as well as radar search techniques, lack of altitude information practically crippled operations at night, or during bad weather conditions. Another night difficulty existed because of the inability of the radar scope to register a fast-moving jet interceptor. The result was that the control of multiple attacks against enemy bombers at night was extremely dangerous.

Another serious difficulty which plagued radar operations was the shortage of PPI scopes.[22] Although during normal operations, the

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21. As in fn 17, p. 43.

22. WADF, "Operations Summary of Operations Order 12-51," 22-23 Sep 1951, p. 27.

number of scopes was generally sufficient for sustained operations, saturation quickly resulted when abnormal traffic density prevailed. It was estimated by WADF Headquarters that the average station in its own region possessed only four PPI scopes, and that additional procurement would take between six and eighteen months. In the meantime, WADF determined that sites enjoying high priority by reason of activity and position would be given the greatest number of scopes at the expense of the less critical sites.[23]

The shortcomings of the radar system described above were reflected in the operational capability of the antiaircraft artillery units. The inability of radar to distinguish between tracks in dense areas or in areas of ground clutter prevented or made difficult the passing of necessary information to antiaircraft positions. In view of this fact, the recommendation was made that each AA position be provided with a search radar of the AN/TPS-1B type to act as an acquisition radar and gap-filler pending delivery of the new T-33 antiaircraft radar which could provide its own tracking information.[24]

The Canadian radar network, still in its full LASHUP phase in 1951, was even worse off than its American counterpart.[25] Exercises at the end of 1951 displayed the complete inefficiency at

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23. As in fn 22.

24. 26th AD, "AA-GCI Coordination," 2 Jan 1952. See also: EADF, "Report on Exercise Greenhorn," 30 Jan 1952, p. 53 (hereinafter referred to as GREENHORN).

25. As in fn 17, p. 69. On Canadian radar see ch. ii, above.

heights over 20,000 feet of what few radars were operational. The Ames II set, with which the Canadian LASHUP sites were equipped, were similar in performance to the AN/TPS-1B set in use in the American LASHUP net. These shortcomings were expected to be overcome in the Permanent Canadian system by the utilization of the two basic American radar sets, the AN/CPS-6B and the AN/FPS-3.

III

During the years in which a radar defense network was in the process of construction in the United States, a corollary effort was directed to the development of a command system through which both the radar net and the remainder of the air defense combat potential could be directed. This command system was generally included in the expression "Aircraft Control and Warning System" and was frequently a physical part of the radar network. In reality, however, it was a combat element of the air defense system separate from the radar, interceptor and AA networks. Its main components were a series of command posts, known (depending on their territorial functions and responsibilities) as Direction Centers, Control Centers, and Combat Operations Centers.[26]

This series of command posts, which we will call the command network, although not functionally concerned with the performance of

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26. As in fn 9. The Direction Center was a radar installation in that it had surveillance and height-finding radar, but it was also a command post, supervising the sub-sector, and providing display of information for tactical evaluation.

surveillance or control operations, depended very closely upon these activities. Essentially, the command network was a means whereby surveillance and tactical information was funneled upwards through the air defense hierarchy to provide sector, regional, and territorial air defense commanders with the information necessary for the formulation of command decisions.[27] Its very essence was a transmission chain for data, and its prime requirement was the presentation to higher and lateral authorities of a timely and accurate picture of the air defense situation in the sub-sectors, where surveillance and tactical operations were concentrated.

This problem of the transmission of data through the air defense system was early recognized as one which would constitute for a long time to come the most important difficulty facing the development of a synchronized air defense system.[28] The crux of the problem lay in the fact that the transmission of timely and accurate data depended upon a chain of human beings rather than upon any automatic device incapable of human error. Error, in fact, was chronic in every transmission link of the network. The only alternative to the existing system (pending development of a new automatic means of data transmission) lay in the continuous simplification of procedures, and in continuous training.

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27. For distinction between sector, region and territory, see ADCR 55-2, "Air Defense Geographical Subdivisions," 26 Feb 1952 (DOC 149).

28. For further information see ADCHR #1, ch. xviii.

Besides the constant factor of human error, other difficulties were revealed in the command network as the air defense system was put through its paces. Critical bottlenecks appeared here and there in the transmission chain. At the Control Centers, Direction Centers, and Combat Operations Centers, the number of personnel assigned were found to be inadequate for heavy and sustained operations. Thus, at the ADDCs of the 26th Air Division, many persons were forced to work eighteen-hour shifts during the fall 1951 exercise.[29] Plotting boards were found to be too small to handle unusually congested traffic. Also, intercommunication facilities at the Direction Centers proved to be easily saturated.

Frequently, delays occurred in the transmission of information from one element of the command network to another. Data sent from the Control Center to the COC was oftentimes held up because of insufficient means of processing the data and because of large backlogs of data awaiting their turn for transmission. Also, the number of reports required by higher echelons in the chain caused much complaint. A considerable amount of operational effort was diverted by the preparation of these reports. The 25th Air Division, for example, reported that controllers and supervisors at its Direction Centers and Control Center were becoming "keepers and passers of reports" rather than "quarterbacks of the team."[30]

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29. As in fn 17, p. 73.

30. As in fn 22, p. 18.

Generally speaking, the increase in activity beyond the normal in an air defense sector threatened to seriously curtail necessary information from reaching higher echelons in the command network. Fighter status information was particularly slow in reaching the ADCCs and COCs.[31] In preplotting between control centers of different sectors, and between adjacent ADDCs, loopline communications were easily overcrowded, thus weakening the defense-in-depth concept of air defense.[32]

Although time lapses in the transmission of information from lower echelons fluctuated from very fast to very slow, the problem of speed was not as critical as the factor of variability in the delay of such information. The problem lay in the fact that superior commanders were unable to obtain a complete picture of the tactical situation as of a given time. Information received by the COCs was registered upon the plotting board when received, without previous

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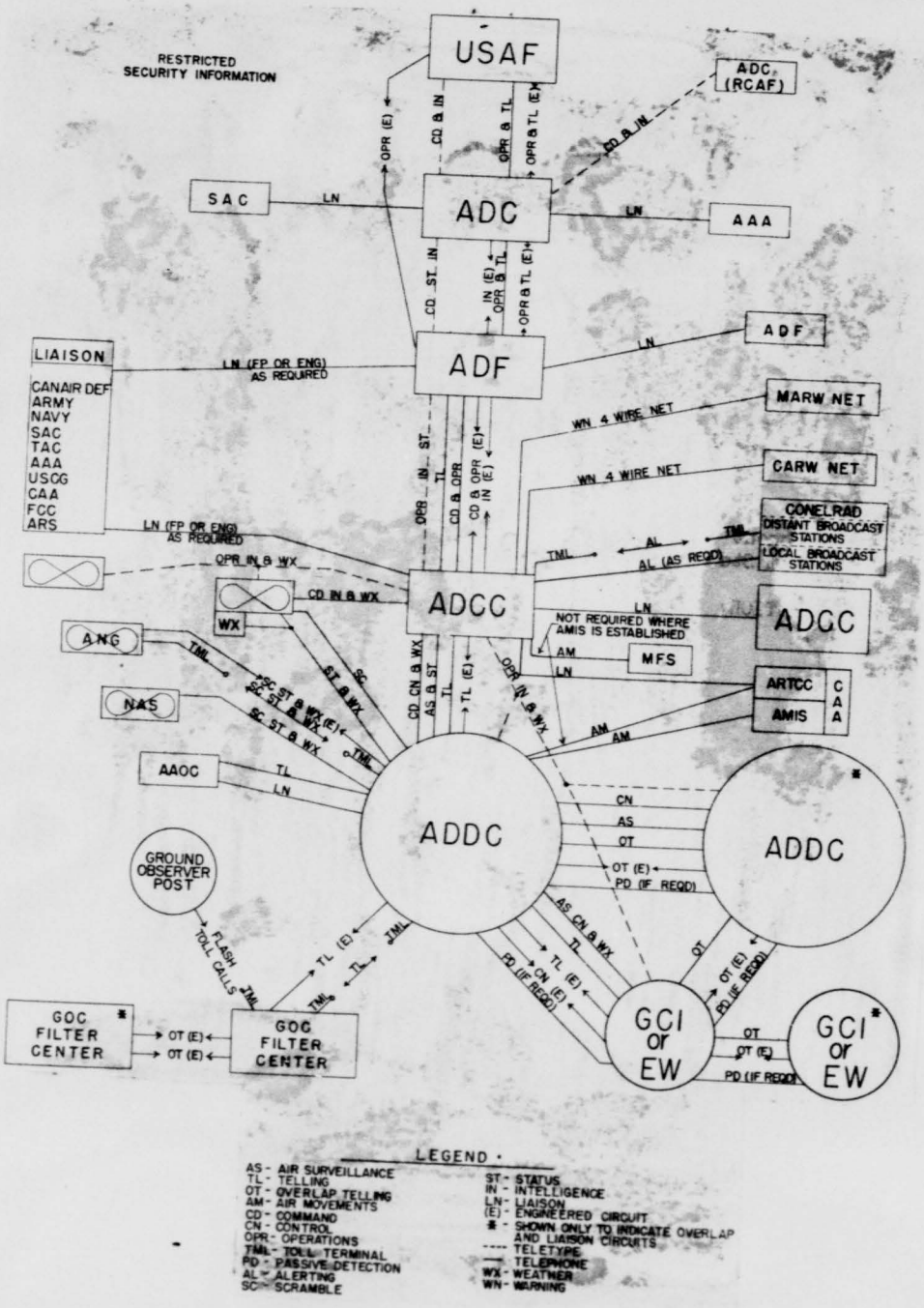
31. ADC believed that it was possible for the ADCCs to receive fighter status information in from 3 to 5 minutes from the ADDCs, and that the COCs of the regions should receive this information no more than 10 to 15 minutes later. ADC COC was required to have this information in less than 30 minutes after the event. In the fall 1951 maneuvers, the average age of fighter status information in the ADC COC was 3 hours. /See ADC to WADF, "Fighter Status Reporting Delays," 25 Jan 1952 (DOC 150)/

32. Shortage of tactical communications in the air defense system was continuously troublesome. "Tactical communications between the CADF COC and our subordinate commands are inadequate to cope with a full-fledged military emergency." /ADC Com. Conf., Oct 1951, pp. 42 ff./ Existing communication shortages were attributed to the fact that communications plans were established in 1949 and had not been revised since. About 10 million dollars was programmed by ADC for additional communications for FY 1953.



Air Defense System
STANDARD WIRE COMMUNICATIONS NETWORK

plot information being brought up to date. The result was an inaccurate total picture. In order to determine the general situation, each individual commander had to use his discretion as to which information on his board was still valid.[33]

An inevitable conclusion which was reached on the basis of the facts described above was that the air defense system was not geared to the changing workloads upon it. The procedures and number of personnel which were adequate during normal operations became ineffective when the load varied. The system could pass information quickly, but ". . . when some links fail there is no escape mechanism to allow an adjustment and return to normal operations."[34]

The growing importance of the Combat Operations Centers in ADC thinking was reflected in an admonition to the Air Defense Forces to insure full and adequate manning of the COCs by providing more "battle station teams" in December 1951. The truth of this observation was borne out by the experiences of the ADC Headquarters COC in an actual alert which took place on 17 April 1952, where the need for trained and capable commanders "on the spot" was felt sorely at

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33. In his introductory remarks to the critique of Exercise HOTROD, held in Nov 1951, Maj. Gen. F. H. Smith, Jr., said: "One thing that has fallen down on every exercise fell down again on this one: the information available to the Commander and his staff at the COC. . . Bear in mind two things: First, is that there are decisions which have to be made here; and second, that there are going to be, from Washington on down, requests for information on ADC, and on us . . . One thing that I think is true, is that personnel involved at the ADCC level do not appreciate either the need for, or the type of information necessary at COC level . . ." [As in fn 17, p. 52]

34. EADF, "Report on Exercise Greenhorn," 30 Jan 1952, p. 17.

the CCCs throughout the air defense hierarchy.[35]

Closely related to the problem of obtaining a timely and accurate picture of the tactical situation at higher echelons of the command network was the difficulty of obtaining usable operational intelligence information for dissemination to agencies other than the Air Defense Command. The complex of activities implied in air defense affected very critically the work of the commanders of the ground armies and the naval districts, as well as civil defense agencies. The RCAF and USAF also required accurate and speedy news of the air battle.

To get this information to these agencies required some means other than the plot information normally available to ADC - preferably a succinct expression of current status and probable developments in the battle picture in the form of a terse news bulletin. To obtain such information from the scenes of tactical activity at the Direction Centers and Control Centers required a new approach to the problem of determining the current status of the air battle. It was felt that a specially trained intelligence officer should be placed at the divisional level to synthesize track information and evaluate the current picture, and to relay this information to the combat operations center where a further synthesis could be made.[36]

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35. Chidlaw to Vandenberg, 5 May 1952, and Incl., "Next to the Real Thing," (DOC 151).

36. As in fn 34, pp. 20-22.

IV

If interceptors were to be placed in contact with enemy bombers before the latter reached their bomb-release lines, there could be no wasted motion in scramble procedures. The lack of adequate early-warning facilities made this an especially important subject for consideration by the command during 1951.

In the matter of standardization of scramble procedures, ADC made considerable progress during the period. It was resolved to establish the ADDC as the authorized agency for the issuance of scramble orders.[37] The ADCCs, of course, would reserve the right to correct, supplement, or countermand these orders, but under ordinary circumstances the ADDCs would bear full responsibility in this respect. This was a natural decision since the ADDCs were in the most advantageous position to maintain timely information of the enemy's movements and close rapport with the interceptor units assigned them for operational control. To further standardize the dissemination of scramble information, it was planned to establish Alert Centers at each airbase through which agency the ADDCs and ADCCs could maintain contact with interceptor crews.[38] In the matter of notifying the crews of scramble action, aural transmission was generally accepted as the most effective means.

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37. As in fn 9, p. 17.

38. ADC Manual (Tentative) "Tactics and Techniques Doctrine for Interceptor Squadrons in Air Defense," 18 Apr 1952, p. 4.

Facility inadequacies remained the greatest deterrent to efficient scramble operations. A serious problem in this regard was the lack of living quarters for crews close to their action stations. The ramifications of this problem, aside from the hindrance it imposed on scramble operations, were summarized as follows by General Chidlaw to General Vandenberg:[39]

> Fighter pilots at some bases in order to maintain the proper alert status, spend as much as 100-110 hours a week on the base. Add to this, the sleeping time and driving back and forth time required, and you get a picture of just how little time they have left for recreation or to spend with their family. This is an acute morale problem, but one for which we see no ready solution, conditions being as they are.

The general lack of facilities for the proper positioning of aircraft for immediate take-off was another serious problem. Under ideal conditions, alert aircraft would be placed as near the end of the active runway as possible to eliminate long, and time-consuming, taxi operations. These conditions were not always present, however. As early as July 1950, plans for an ideal arrangement of an air base to meet this requirement were drawn up and forwarded to USAF, but as yet, no immediate action is foreseen for remedying the situation.[40]

The lack of adequate ice and snow removal equipment for keep-

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39. As in fn 35.

40. ConAC to USAF, "Airfield Criteria and Operation Factors for Fighter-Interceptor Units and Air Force Headquarters," 22 Jul 1950.

ing runways open, especially in the Northeast and Northwest areas, continued to inhibit scramble operations. This problem occasioned much thought and controversy in ADC as to whether to leave the snow on and attempt to compact it, or to attempt to remove it completely. The attitude of Colonel Ward Abbott, ADC Headquarters' Director of Installations, on the matter was as follows:[41]

> The only answer . . . is to get the snow off as promptly and completely as possible. We have talked about having heated runways to keep the snow melted off. It costs a terrific amount of money. USAF is running . . . a research project to try to get the answer to adequate snow removal. By adequate, I am thinking in terms of fighter operations where you want a smooth, non-skid surface. Compacted snow probably isn't the answer . . . What you would like to have is a clean, dry pavement all the time. The only way to get it, or to approach it that I know of is to have plenty of equipment, plenty of operators, and a well-organized plan to start snow cleaning the minute it starts to snow and keep it clean as the snow falls. Of course, if you run into sleet storms and things like that, it is a much nastier problem. .

Operationally speaking, there was little change in scramble procedures during the latter half of 1951. Under normal conditions, two interceptors were scrambled for interception purposes. This practice brought successful interception closer to reality in that

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41. ADC Com. Conf., Oct 1951, p. 125.

one aircraft could continue if the other aborted.[42] Realistically, two interceptors would stand little chance if the unknown they were investigating proved to be a formation of enemy bombers. That such a consideration was well-known by ADC and was the subject of investigation is indicated in the following remarks by General Frederick H. Smith, CG of EADF, in the critique of operation HOTROD:[43]

> . . . we have not worked out at all well . . . our tactics and techniques . . . of feeding additional fighters into a bomber stream or bomber clutch when initial interception has been made with a force which is insufficient to effect 100% kill. It would be a terrible thing to have made a clean interception 110 miles from target, and then have fiddled around with 4 F-94s against 6 B-50s and let three or four of them get in to drop their A-bombs when we had tracked them all the way in.

The utilization of combat air patrol (CAP) for scramble continued to be a point of considerable discussion. Statistics favored CAP over ground scramble in showing a smaller time lapse.[44]

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42. The problem of aborts was a serious one. Thirteen percent of the sorties flown in Operation HOTROD, for example, aborted. The reasons for this high number were mainly technical, and a list of the main causes is revealing in showing the complexity of the problem of maintenance of aircraft in air defense operations. These were the reasons for aborts in this particular exercise: communications failure, airborne radar failure, overhead light on during flight, afterburner inoperative, tip-tank failure, faulty fuel regulator, excessive fuel leak, lack of oxygen, fumes in cockpit, rough engine or excessive magneto drop, starting failure, canopy would not lock, gun door opened on take-off, landing gear not locked up, blown tire, brake trouble, shimmy damper malfunction, faulty scramble and joinup. [As in fn 17, p. 27]

43. As in fn 17, p. 53.

44. As in fn 17, pp. 23-24.

Nevertheless, the problem was not so simple, for CAP for jet aircraft was exceedingly uneconomical in fuel consumption. The situation was somewhat more favorable, however, to the use of conventional (prop-driven) aircraft for this purpose; the slow speed and rate of climb of the F-51 and F-47 fighters, and their relatively slow rate of fuel consumption in comparison with jet aircraft pointed to the efficacious use of the former for CAP purposes. Although the use of CAP was not firm, and differences were expressed freely as to its merits, by early 1952 the consensus appeared to favor the extension of the technique. In fact, Project CHARLES recommended the wide use of CAP and instigated a movement in USAF towards the development of air-to-air refueling of jet aircraft for this purpose. This suggestion was not favorably viewed by ADC because of the extreme difficulty entailed in air-to-air refueling at night or in adverse weather.[45]

V

The hundreds of complex operations which made up the process of air defense converged in the work of the air defense combat team of pilot and director. No matter how elaborately organized and how efficiently all other elements of the air defense system operated, in the final analysis it was the ability of the director and pilot to capitalize on the information and resources made available to them which spelled, or could spell, the difference between success and

45. USAF to ADC, "Air-to-Air Refueling," 5 Dec 1951 (DOC 26).

failure of the system as a whole.

Certain equipment deficiencies which very naturally affected the capabilities of the GCI function have been mentioned. For example, it was exceedingly difficult for the controller to detect and track interceptors with radar presently at his disposal; consequently, it was dangerous to attempt to vector the interceptor close to the bomber at night or in foul weather, especially in a multiple attack. So far as airborne radar was concerned, it was particularly vulnerable to ground clutter at altitudes below 15,000 feet, so that positioning of night fighters above the target when the bomber was flying at medium altitudes made it difficult for the radar observer in the interceptor to pick-up the bomber in the cluttered radar scope.

Not every problem in controller-operations, however, was attributable to equipment deficiencies; the skill of the controllers was a vital consideration since, not by a long shot, was GCI even close to attaining that degree of automatic self-sufficiency fondly predicted for the future. In most cases, the GCI process was only as good as were the men handling it, and, as the operational tests showed, the men, in many cases, were not as good as they had to be. The action ADC was taking to correct this deficiency will be discussed subsequently in this section.

The 1951 exercises revealed that controllers were still not positioning interceptors advantageously, either during day or night attacks. During daylight operations, they were not utilizing the sun

to proper advantage.[46] At night, they often ignored the limitations of airborne radar by positioning interceptors above the "enemy" when the latter was flying at medium altitudes. As mentioned earlier, multiple attacks at night or in foul weather against a single or multiple formation posed an exceedingly difficult problem. In early 1952, EADF, in an effort to resolve the matter, conducted an experiment to test the principle of the "radar snake." In this tactical maneuver, each interceptor was locked on by radar to the one before it. In this manner, the formation could be maintained on both the pilot's and the director's scopes. It was found that this technique was very good as an assist in keeping formation except where violent maneuvers were entailed or during tight turns when the formation tended to split apart.[47]

Another controller problem, and one which could be resolved only with additional training, was that of passing of control of interceptors between neighboring sub-sectors. This process, during the 1951 maneuvers, was quite erratic, both because of the preoccupation of directors with the problems of their own territories and because of the absence of sufficient communications facilities between control stations. Repeated admonitions to direction center personnel to bear in mind the importance of the principle of lateral dissemina-

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46. As in fn 34, p. 55.

47. EADF to ADC, "Report of All-Weather Fighter Evaluation Test (Pop-Eye)," 7 Feb 1952 (DOC 152).

tion of information had not as yet borne fruit in late 1951 - at least, not to the extent required to assure an adequate defense in-depth capability. It was observed that fighters being passed often-times were given contradictory information by the new controller. The result was a loss of confidence and awareness of the air situation on the part of the pilots.

Two additional problems which conceivably could be categorized among those of the controller related to the recovery and turn-around of interceptors. The important issue in recovery operations was the conservation of interceptor strength. One problem in this respect was whether to retain the interceptor in the air for combat air patrol duty or to land it at an appropriate air base for reservicing. Some believed that this operation was not properly relevant to the work of the director or controller in that it distracted him from his primary function. These persons recommended that the Airways and Air Communications System (AACS) take over this function. On the matter of turn-around of interceptors, speedy action in this respect could make up, in part, for the shortage of interceptors which plagued the system. Basically, however, this was a materiel and supply problem, and its solution lay in more efficient support operations.

Though much depended, as has been noted, on the skill and knowledge of the controller, the pilot also had considerable responsibility placed on his shoulders for assuring the success of GCI operations. Besides possessing flying and combat skill, the pilot had to be intimately familiar with the problems facing the controller

and the capabilities of the ground radar for keeping him under surveillance. Particularly was this true in night operations. In such formations as the "radar snake," any sudden deflection by the pilot from course could well break the radar chain and render the controller helpless in further tracking the progress of the interceptor element toward the target. This need for the closest of rapport between aircrews and controllers had long been recognized in the programs established for cross-training. Examination of the reasons for unsuccessful interceptions supports this observation by revealing that defects in either ground or airborne radar equipment or error on the part of either controller or pilot was sufficient to vitiate or negate the entire GCI process. For example, operation HOTROD listed among the reasons for unsuccessful intercepts (i. e., intercepts attempted but never completed) the following: target faded, contact lost, GCI equipment failure, radar performance inadequate, target out of range, weather, darkness, fighter abort, ECM and VHF jamming, VHF crowded, late flight plan correlation, personnel error, late scramble.[48]

The insufficient number and instability of tenure of those controllers assigned continued to present a major problem. Plans for the Permanent radar system envisaged each of the permanent radar installations possessing a 24-hour operational capability. It was estimated that by 30 June 1952 ADC would have a requirement for 1133

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48. As in fn 17, p. 23.

controllers.[49] By the end of 1951, slightly more than half this number, with the necessary qualifications and specialty designations, were available. Considering the fact that a good many of these were ANG personnel who would be eligible for discharge, the shortage was made even more serious.

On 7 February 1952, ADC requested USAF to allocate the entire quota of ROTC graduates for 1952, excepting engineers, and all OCS graduates to ADC until its requirements were met. ADC volunteered to give these persons on-the-job training until space in controller schools was available. USAF responded to this request by offering ADC a total of 419 officers from OCS and ROTC and from Reservist recallee sources. It was noted, however, that many of these officers would be free to apply for pilot and graduate technical and psychological warfare training. Since the resources of the Air Training Command's controller course at Tyndall AFB, Florida, were inadequate to handle such large numbers as ADC required, ADC prepared for training the majority of these new officers within its own establishment. To this end, the air defense forces were alerted and directed to prepare for the establishment of such schools within each of their areas.

The problem of the qualifications of the controllers had been pretty well resolved by the end of 1951. Originally, ADC believed

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49. ADC to USAF, "Requirement for Controllers, Fighter- Interception," 7 Feb 1952 (DOC 153); USAF to ADC, "Allocation of May-June 1952 AFROTC Graduates," 3 Mar 1952 (DOC 154); TWX, USAF to ADC, 26 Mar 1952 (DOC 155).

that each controller had to possess a flying rating. In view of the chronic shortage of pilots, however, such a policy was quite impracticable. Because ADC had followed this policy prior to the outbreak of the Korean War, it lost a considerable number of controllers when they reverted to pilot status to meet the requirements imposed by that action. At the end of March 1952, General Smith settled this matter with the announcement of the decision that non-rated personnel would be eligible for controller positions as high as senior directors.[50]

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50. ADC to WADF, "Assignment of Non-rated Personnel to Controller Positions," 26 Mar 1952 (DOC 156).

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