NINETEEN YEARS OF AIR DEFENSE

HISTORICAL REFERENCE PAPER NO. 11

1 MAY 1965

Directorate of Command History
Command Public Affairs Office
HEADQUARTERS NORAD

SECRET

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TOTAL	66

REDISTRIBUTED BY HQ NORAD	
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NINT	1
NNPA	1
NOPS	1
NOOP	1
NOEV	1
NOCC	1
NOOA	1
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NPAP	1
NPPA	1
NPPP	1
NPMO	1
NPSD	1
NELC	1
NGAM	1
NNCH	25

FOREWORD

North American air defense development from early 1946 to 1965 is summarized in this paper. The main purpose of the paper is to provide an orientation history for officers newly assigned to air defense. It also provides all readers a handy reference to the mainstream of development of air defense on the North American continent.

Because this paper is designed to be brief and easily read, it follows only the main line of growth and changes thereto. It does not deal with unfulfilled requirements and plans, except where necessary to the main story, or attempt to look beyond current events.

This summary is a complete revision and updating of Historical Reference Paper No. 9, Seventeen Years of Air Defense, 1 June 1963, which it replaces.

Colorado Springs, Colorado
1 May 1965

L. H. BUSS
Director of
Command History

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CHAPTER ONE

THE POST-WAR PERIOD
1946 - 1951

PRIOR TO KOREA - AIR DEFENSE IN NAME ONLY

(U) "It appears to us on the receiving end," wrote an Air Defense Command officer in 1946, "that the War Department is afraid that another Pearl Harbor might conceivably occur in the United States and although the War Department is unwilling to take any affirmative action to prevent such a contretemps, it has avidly passed the buck on down the line so that a scape-goat will be convenient if necessary." However mistaken this view was, it does show the frustration that ADC officers felt in 1946 trying to carry out the mission of defending the U.S. with almost no forces.

(U) Activated at Mitchel Field, N.Y., in March 1946, under Lieutenant General George E. Stratemeyer, ADC was given two fighter squadrons, a few radars, and an organization of six numbered air forces, only two of which were active. There was about the same size force in Alaska. The AAF had organized the Alaskan Air Command in December 1945 at Davis Airfield under Brigadier General Edmund C. Lynch. AAC inherited two radar squadrons and three interceptor squadrons.

(U) Post-war demobilization made all resources scarce. But also, the U.S. felt secure behind its atomic monoploy and long-range bombers so that air defense received little attention at this time. But it is apparent in retrospect that while the defenses were weak, there was really no great threat. Air defense was just starting out, but Russia was just starting to build an offense. Of course, the threat picture soon changed. By 1 January 1949, it was

estimated that the Soviets had 250 TU-4's, an aircraft approximately equal to the USAF B-29A,* and in the fall of that year Russia exploded an atomic device.

(U) In 1948, Air Force Headquarters was spurred by various crises in the world into erecting a temporary radar network with World War II equipment. By the time of the Korean War, June 1950, ADC had a system of 44 stations operating. In Alaska, AAC had a five-station temporary system by the latter date. In Canada, an Air Defence Group was set up on 1 December 1948 as a separate organization within Headquarters RCAF at Ottawa. The group moved to RCAF Station St. Hubert the following year. There were three radars operating in Canada as of mid-1950.

(U) In all, thus, there were a total of 52 radars operating in North American air defense at mid-1950.

(U) Meanwhile, in March 1949, Congress had approved an Air Force request to build a new radar system for the U.S. and Alaska. This program was to provide 75 stations and ten control centers in the U.S. and ten stations and two control centers in Alaska. These stations were called Permanent System stations to distinguish them from the temporary stations erected earlier. The "P" designation for

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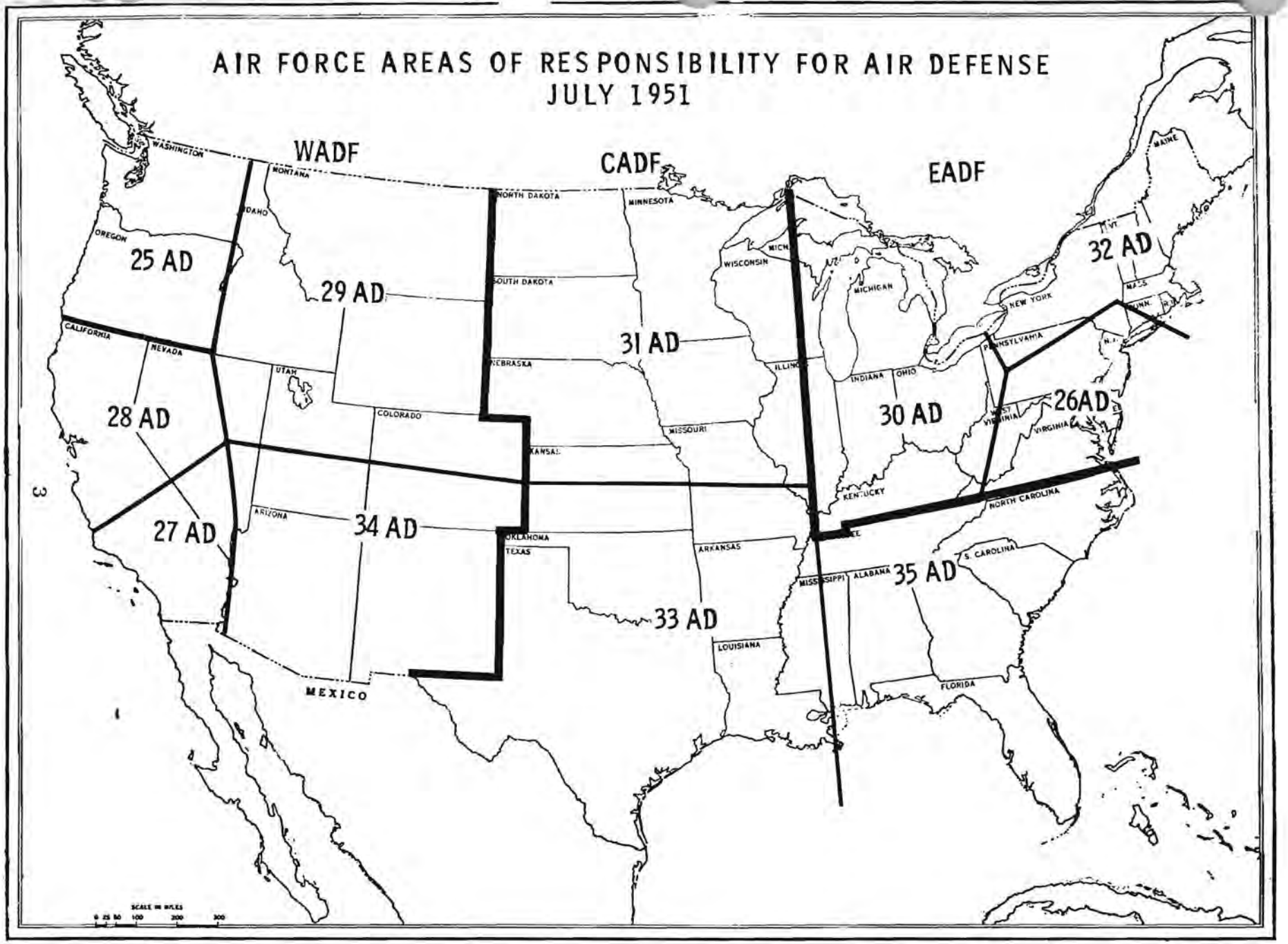
* (U) The TU-4 was so similar to the U.S. B-29 that a worry was that if an attack was made, the Russians might put U.S. markings on their bombers to confuse the defenses. A joke among ADC pilots was that if one went up to identify a B-29-type bomber, identification could be made by looking in the window. If someone in there was pouring coffee out of a thermos, the bomber was American, but if he was pouring tea out of a samovar, it was Russian.


AIR FORCE AREAS OF RESPONSIBILITY FOR AIR DEFENSE
JULY 1951
WADF
CADF
EADF
25 AD
29 AD
31 AD
32 AD
28 AD
30 AD
26AD
27 AD
34 AD
33 AD
35 AD
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
S. CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
MAINE
MEXICO
SCALE IN MILES
0 25 50 100 200 300

RCAF Mustangs

USAF F-82

F-94A

EARLY POST-WAR INTERCEPTORS

stations in the U.S. was used until July 1963.*

(U) ADC also attempted to solve the problem of poor surveillance at low altitude and tested a civilian observer system. Formal approval was given by USAF on 1 June 1950 to set up in the U.S. a Ground Observer Corps network of 26 filter centers and their associated observation posts.

(U) Interceptor strength rose slowly alongside the growth of the radar net. In the U.S., ADC's force increased to 23 squadrons by mid-1950. AAC had four squadrons by that time. The aircraft in use were propellor-driven types and day jets mostly. There were also a few F-94A's, an early radar-equipped jet. Canada's first post-war interceptor squadron was formed in December 1948. A second squadron was added the next year. This made a total of 29 interceptor squadrons on the North American continent at the start of the Korean War.

(U) Army antiaircraft forces were not significant in air defense before the Korean War. Until early 1950, there were no units assigned primarily to air defense in the continental U.S. And at that time the only AA units on site were at the Soo Locks and the Hanford AEC installation. In Alaska, the U.S. Army Alaska (USARAL) had three gun battalions by mid-1950.

(U) In the meantime, in the U.S. in 1948, USAF tried a means of pooling resources to increase the force available by placing the Tactical Air Command and ADC under a new command, the Continental Air Command. The latter eventually took over direction of the air defense effort. In 1949, ADC was reduced

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* (U) Until July 1963, there was a profusion of designations for radar sites in the CONUS. The sites were designated in accordance with the program under which they were built, e.g., P for Permanent Program, M for Mobile, SM for Second-Phase Mobile, TM for Third-Phase Mobile, etc. All USAF CONUS stations were redesiganted "Z" in July 1963.

to record status and on 1 July 1950 it was abolished.

AFTER KOREA - AIR DEFENSE BUILDUP

(U) The start of the Korean War marked a sharp turning point in air defense buildup as it did military preparedness in general. The Korean War followed a long series of crises and threats to peace that included the Berlin Blockade and the Russian explosion of an atomic bomb. And then suddenly there was a hot war and the lid on preparedness came off.

(U) On 27 June 1950, both the Continental Air Command and the Alaskan Air Command began 24-hour operations. Around-the-clock operation of the air defense system in the U.S. and Alaska dates from this time. ADC was re-established on 1 January 1951 and opened at Colorado Springs, Colorado, on the 8th. A few months later, 21 Air National Guard fighter squadrons were federalized and assigned to ADC, doubling its interceptor strength. A second major radar program for ADC was approved by USAF in July 1951. Given the name Mobile Program (because the idea at first was to deploy mobile radars), it provided for 44 radars to start with.

(U) The Army formed the Army Antiaircraft Command (ARAACOM) on 1 July 1950 at the Pentagon under Major General Willard W. Irvine. The following January, ARAACOM Headquarters moved to Colorado Springs. The Army command was assigned 23 gun battalions in April 1951 and increased in strength to 45 battalions by the end of the year, half of the increase (ten battalions) coming from the National Guard.

(U) In Canada, the Air Defence Group formed in 1948 was redesignated the Air Defence Command on 1 June 1951 and placed under then Air Vice Marshal

(Top)- 90mm

(Bottom) - 120mm

C.R. Dunlap.* By this time, the U.S. and Canada had worked out arrangements for a radar extension plan (later termed the Pinetree Plan) to build 33 radar stations in Canada. Formal agreement was concluded with an exchange of notes on 1 August 1951. The 33 stations were to stretch in a line across southern Canada and up the east coast. The U.S. was to finance 22, Canada 11. Manning and operation were also to be divided. The Northeast Air Command (see below) was to man nine of the stations in its area, USAF ADC was to man eight stations along the southern Canadian border, and RCAF ADC was to man the other 16 stations. To provide coverage until the Pinetree radars started operating, Canada set up a five-station temporary system.

(U) RCAF ADC's interceptor force was brought to a total of six squadrons by the end of 1951. ADC's squadrons were equipped with Vampire, Mustang, or Sabre aircraft.

(U) A final part of this emergency-inspired effort to get a defense in being was made in the area termed the Northeast, which included Newfoundland, Labrador, Northeastern Canada, and Greenland. On 1 October 1950, the JCS established the U.S. Northeast Command at Pepperrell AFB, St. Johns, Newfoundland. Part of USNEC's mission was to defend the U.S. from attack through the arctic regions in the northeast area. Also, on 1 October, USAF established the Northeast Air Command at the same base, as the Air Force component of USNEC. Major General Lyman P. Whitten was named commander of both organizations.

(U) As noted above, NEAC's permanent radars were part of the Pinetree System, with the exception of three radars in Greenland. As in other

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* (U) Later to reach air marshal rank and to become RCAF Chief of Staff and, in 1964, Deputy Commander-in-Chief of NORAD.

areas, while the Permanent net was being built, a temporary system was set up. This consisted of five stations, none of which became operational before early 1952. NEAC had no other air defense forces before 1952 when its first interceptor squadron arrived.

CHAPTER TWO

MANNED BOMBER DEFENSE 1951 - 1959

DEVELOPMENT - AT A GLANCE

(U) Manned bomber defense grew and improved nearly continuously from 1951 to a point in the late 1950's where there began a leveling off. Having only a small force of World War II equipment in 1951, air defense had much room for expansion and improvement. Growth spread the defenses from around a few targets to cover the whole continent and there was continuous modernization. New weapons replaced the old twice during these years. But the threat also changed during this period, going from the TU-4 propellor-driven bomber to jet bombers and the intercontinental ballistic missile. Space weapons were on the horizon.

(S) The great growth of the manned bomber defense forces during the 1950's can be illustrated by a few comparisons. At the end of 1951, the forces on the North American continent assigned to air defense consisted of 51 interceptor squadrons, 48 antiaircraft gun battalions, and 65 radar stations. At the end of 1959, the regular forces amounted to 67 interceptor squadrons (down from a peak of 86 in 1957), 61 Nike Ajax/Hercules missile battalions, two Bomarc A squadrons, three Skysweeper gun batteries, and over 300 radar stations plus the DEW and Mid-Canada Lines and extensions.

(C) Numbers by themselves mean little, of course. In comparison with the 1959 force, the 1951 force was in the horse and buggy days. For example, the interceptors in 1951 were mainly propellor-driven planes or day jets. A few all-weather jets, F-89B or F-94A, were available. But the F-94's had no de-icing equipment. Interceptors carried fixed guns,

either .50 caliber machine guns or 20mm cannons. The antiaircraft weapons were 40mm, 90mm, and 120mm guns. The radars were World War II types, almost entirely, clustered around only the most vital target areas.

U (S) At the end of 1959, over half of the interceptor force were all-weather super-sonic jets. The others were advanced models of earlier all-weather jets, such as the F-89J and F-86L. Interceptors were armed with rockets or missiles and over a third of the U.S. aircraft were capable of employing nuclear weapons. Every important area of the U.S. and Alaska was defended with Nike missiles. About one-third of the Nike force, the Hercules units, which were deployed widely, could carry nuclear warheads. The 300-plus radar stations included 184 prime land-based sites and 114 gap fillers in the U.S., Canada, and Alaska, plus radars in ships, planes, and towers off the U.S. coasts, providing coverage over and around the populated areas. The DEW Line with its extensions and sea barriers and the Mid-Canada Line provided early warning to the populated areas.

GUIDING CONCEPTS

(U) Two basic concepts guided U.S. and Canadian air defense officials in planning and developing the manned bomber air defense system. One was the "polar-orientation" concept. This concept was that the defenses should face or be oriented northward -- the direction from which an attack was considered most likely to come. This concept prevailed right from the start of post-war air defense. Expansion of the system, therefore, was generally in a northerly direction.

U (S) The other concept was that there should be a progressively concentrated "defense in depth." According to this concept, an enemy should be attacked as far out as possible initially and the pressure on him increased as he neared his objectives by the employment of increasing numbers and

varieties of weapons (hence the "family of weapons" concept). This defense in depth concept can be seen in very early plans and was fully developed in USAF ADC's requirements plan for 1954 to 1960 issued in mid-1953. ADC's requirements for long and medium range interceptors and long and short range missiles would, the ADC Vice Commander, Major General Frederic H. Smith, Jr., said, "enable us to carry the air battle far from the target areas and to subject the hostile forces to prolonged and decisive attrition." CONAD and NORAD adopted this concept.

THE RADAR NET

(U) In keeping with the above, the radar net developed in two ways -- growth and improvement of coverage over and around the target areas and extension northward from the target areas. The former is covered below under land-based systems and seaward extension and the latter under early warning.

LAND-BASED SYSTEMS

(S) As shown in the first chapter, the foundations were laid for the basic radar systems in the U.S., Canada, and Alaska by the start of 1951. These were the Permanent System of 75 stations in the U.S. and ten in Alaska, and the Pinetree System of 33 stations in Canada. In the U.S., ADC got its P-system stations operating by the end of 1952. Alaskan Air Command had phased over from its temporary stations to its permanent stations by early 1953, but it was about a year before all stations were operating fully. In 1954, also, all of the Northeast Air Command's permanent stations reached fully-operational status. The remaining stations in Canada started coming into operation by the end of 1952 and all but two had become fully operational by mid-1954.

U (C) Thus, the basic radar system was operating in the U.S. by 1952, and in all other areas by 1954. But even before these systems were completed, the USAF and RCAF had given attention to extending coverage and filling gaps both in area and altitude.

U (S) To beef up general coverage and protect SAC bases, in July 1951, a second major program, the Mobile Program, was approved by USAF. It first was for 44 radar stations. A year later, 35 more stations were added and in 1954 another 29. The total was not, however, the sum of these figures, for the program was revised many times. At the end of 1959, 69 stations under this program were planned for the U.S., 59 were operating.

U (S) A third land-based radar program for the U.S. was approved by USAF in January 1954. This provided radars for low altitude coverage, called Gap Filler radars. Initially, ADC proposed 323 gap-filler stations but soon dropped its goal to 235 sites. Many revisions followed, however, and at the end of 1959, 195 stations were programmed, 108 operational.

(U) Before the gap-filler system was operating, ADC expanded its Ground Observer Corps for low altitude surveillance. By 1954, the GOC was operating in every state of the nation. The high-water mark of the GOC was reached in December 1956 when over 18,000 posts were organized. The GOC was discontinued on 31 January 1959. It was no longer needed by this time because of better radar coverage and increased capability of the threat.

U (S) In the meantime, additions were also being made to the systems outside the continental U.S. To plug gaps in the Alaskan net of ten stations, eight more radars were programmed by 1953. NEAC got approval in 1955 to add six gap fillers to its system. Two of Canada's original stations were removed by 1959 but three others were added as part of the USAF ADC Mobile Program, making a total of 34 stations (including those in the NEAC

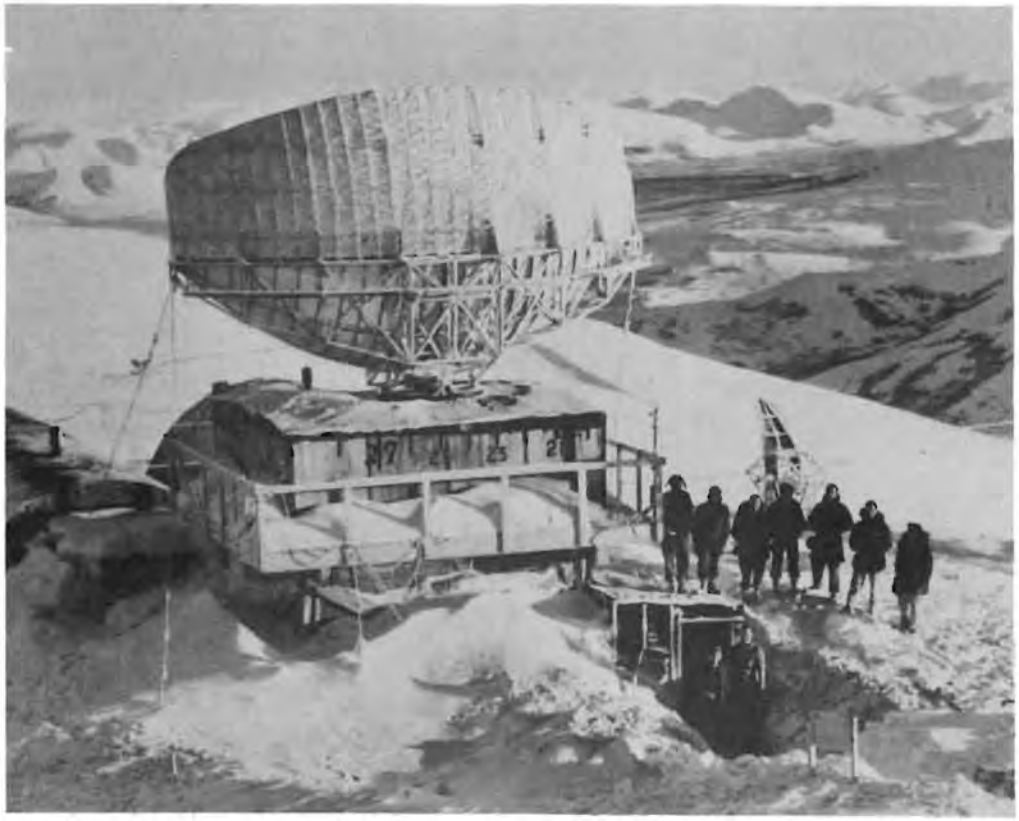
area). Agreement had been reached by the two governments in June 1955 to build these Mobile Program stations.

U (S) Agreement for a much more extensive program that was to be jointly financed was reached in 1959. This program, termed Continental Air Defense Integration, North (CADIN), was to provide seven prime radars, 45 gap-fillers, a SAGE CC/DC, and two Bomarc squadrons. It was also planned to tie the Pinetree radars into the SAGE system. None of the CADIN radars was operational by the end of 1959.

U (S) By 1958, improved radar was programmed for nearly every element of the surveillance system on the continent. This included the land-based prime stations, gap-fillers, the DEW Line, and the seaward extension radars. The radars that had been installed in the early 1950's at the land-based prime sites, mostly FPS-3's and CPS-6B's, were highly vulnerable to ECM and inadequate by the late 1950's against high-speed, very-high altitude targets. One program underway was to modify radars to, or replace them with, FPS-20's which had much greater range and altitude. Eighty-six FPS-20's were operating by the end of 1959.

U (S) But also in 1958, USAF approved a program to replace nearly all existing radars with new frequency diversity (FD) radars of various types. These had even greater range and altitude and anti-jamming features. The FD program soon became unstable, however, due to budget cuts and technical problems and many revisions were being made. The program was still shifting at the end of 1959 and none of these new FD radars were operational. Improved radars for the gap-filler system, the DEW Line, and other systems were also in a state of flux at the end of 1959.

SEAWARD EXTENSION



CPS-5 AT SPARREVOHN MT., ALASKA

GROUND OBSERVER CORPS POST

OFF-SHORE RADAR PLATFORMS -
Navy Picket Ship, Navy
Blimp, Air Force Texas Tower

(U) During these years, ADC was also extending the contiguous land-based coverage out to sea off both coasts. Radar was put on every conceivable platform -- ships, planes, blimps, and towers.

U (Ø) Navy picket ships were the first to carry surveillance out to sea. In 1950, following an air defense request for ten stations, the Navy was able to provide the emergency use of two ships off the East Coast. As the Navy's capability increased, so did its support. It placed one picket ship on duty full time off the East Coast in September 1952. The next year, it agreed to provide picket ships and blimps. By July 1955, five picket ship stations were manned off the Atlantic Coast and one station off the Pacific Coast. Five off each coast were manned at the end of 1959.

U (Ø) The second radar platforms used were Lockheed Super Constellations, designated RC-121's. An RC-121 airborne early warning and control station was manned off the Pacific Coast in August 1954 and off the Atlantic Coast in September 1955. Three eastern and four western stations were manned by the end of 1959. A Navy blimp early warning squadron, ZW-1, began manning one East Coast station on 1 July 1957. This was the extent of blimp operations.

U (Ø) Texas Tower radar platforms were suggested by the Lincoln Laboratory of M.I.T. in 1952. USAF approved five towers but later cut the total to three. The first one was placed on Georges Shoal off Cape Cod and began operating in May 1956. Two other towers were operating by end-1959.

EARLY WARNING

U (Ø) In 1954, the U.S. and Canada approved the building of a distant early warning line in the far north. Early the next year, the JCS approved two segments of the line -- the land-based portion and a western sea extension. The land route was to run

from Cape Dyer, Baffin Island, generally within about two degrees of the 69th parallel, to Cape Lisburne, Alaska. The sea extension was to run from Kodiak Island to Hawaii. The latter was changed before it became operational to run from Umnak in the Aleutians to Midway Island. Six land-based radars were to extend coverage from the last Alaskan radar at Naknek out to Umnak. Two eastern extension routes were approved by the JCS in 1956. One was to run from Cape Farewell, Greenland, to the Azores; the other, termed the G-I-UK Line, was to cross Greenland, then to Iceland, and then on to the UK. A four-station surveillance line was planned to cross Greenland.

U (S) Meanwhile, in 1954, Canada decided to build another early warning line at about the 55th parallel. This Mid-Canada Line (MCL) had been recommended the previous year by the joint U.S. - Canada Military Study Group. The line was to run from Hopedale, Labrador, to Dawson Creek, British Columbia. The first MCL stations began limited operations in May 1957. The line was declared fully operational on 1 January 1958.

U (S) By 15 July 1957, the DEW Line (Cape Dyer to Cape Lisburne) was declared technically ready. But many months were required to bring the performance of the line to required standards. Limited operations on the first eastern sea extension, which ran from the Navy base at Argentia, Newfoundland, to the Azores, began on 1 July 1956. A fully operational barrier was established one year later between these points. The Pacific Barrier became fully operational on 1 July 1958. It ran from Kodiak Island to Midway until March 1959 when the six Aleutian radars became operational. The northern terminal of the sea barrier was then moved to Umnak. Both the Atlantic and Pacific barriers were manned by Navy DER's and AEW aircraft.

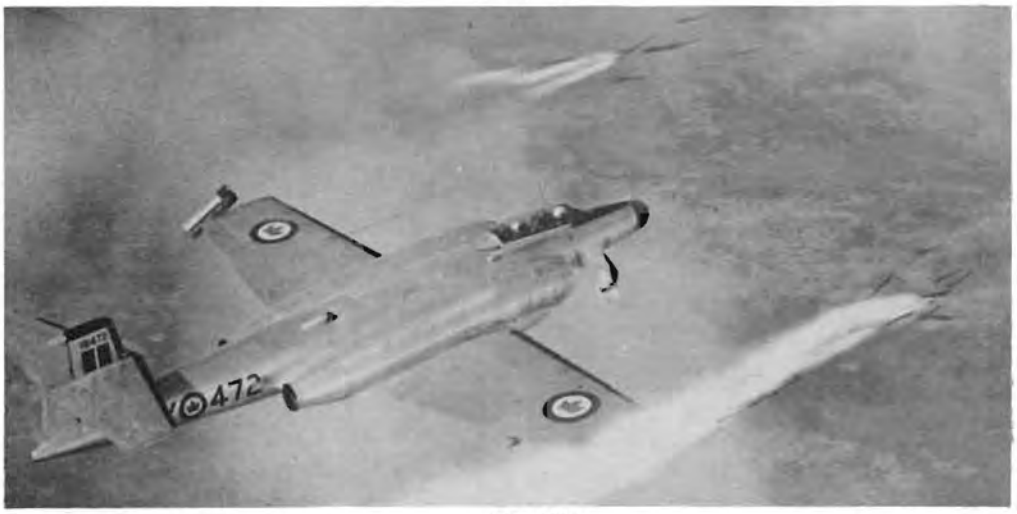
THE WEAPONS

INTERCEPTORS OF THE MID-1950's

F-86D

F-89D

F-94C



CF-100

F-102A

F-101B

INTERCEPTORS ARRIVING IN THE
LATTER HALF OF THE 1950's

INTERCEPTORS

(C) Until 1953, the interceptor forces were equipped mainly with piston-engine planes and day jets. The U.S. forces began to get radar-equipped F-94A's in 1950 and the first truly all-weather jet aircraft, the F-89B, in 1951. Less than half of the total squadrons had F-94's or F-89's at the end of 1952. Modernization and a great increase in effectiveness came in 1953 and 1954 with the conversion to improved all-weather jet interceptors armed with rockets. USAF ADC got F-86D's, F-94C's, and F-89D's armed with 2.75" rockets. AAC's interceptor force converted to F-89D's by the end of 1954 and RCAF ADC had nine squadrons of CF-100's by the latter date.

(S) A new round of conversions for the U.S. forces began in 1956. Of greatest significance was the arrival in ADC of the long-awaited F-102A, the first of the supersonic "century-series" aircraft. Besides its other advantages, the F-102A was armed with the Falcon air-to-air guided missile. A Falcon-armed modification of the F-89 was also placed in ADC in limited numbers. And at the very end of 1956, still another advance in armament -- to nuclear-armed missiles -- was achieved with the arrival of the MB-1-carrying F-89J's.

(S) F-102A's and F-89J's went to the Alaskan Air Command and to the U.S. squadrons in the Northeast Air Command the following year. The RCAF had planned to replace its CF-100's with the super-sonic CF-105, but in 1959 the latter was cancelled.

(S) USAF ADC got three other new aircraft in the next two years. First, in January 1958, it began the receipt of four squadrons of F-104's (removed in 1960 because they could not operate with SAGE). A year later, F-101B's began to arrive and the following May, the first F-106A's arrived. The F-89J was the only nuclear-armed aircraft until the MB-1-armed F-101B arrived, a period of two years. The F-106A could also carry the MB-1.

(S) In numbers of squadrons, the NORAD interceptor force reached a peak figure of 86 in late 1957. The force had dropped to 67 squadrons by the end of 1959.

GUNS AND MISSILES

(S) By the end of 1954, the Army Antiaircraft Command had reached its original goal of 66 battalions. There were also four gun battalions in Alaska and one gun battalion at Thule, Greenland, by this time. The first Nike Ajax missile arrived in late 1953 and by September 1955, Ajax batteries outnumbered gun batteries in the U.S. Sixty-one Nike battalions was the goal. This was met by mid-1957 (244 fire units on site). Gun units for all practical purposes had been eliminated.

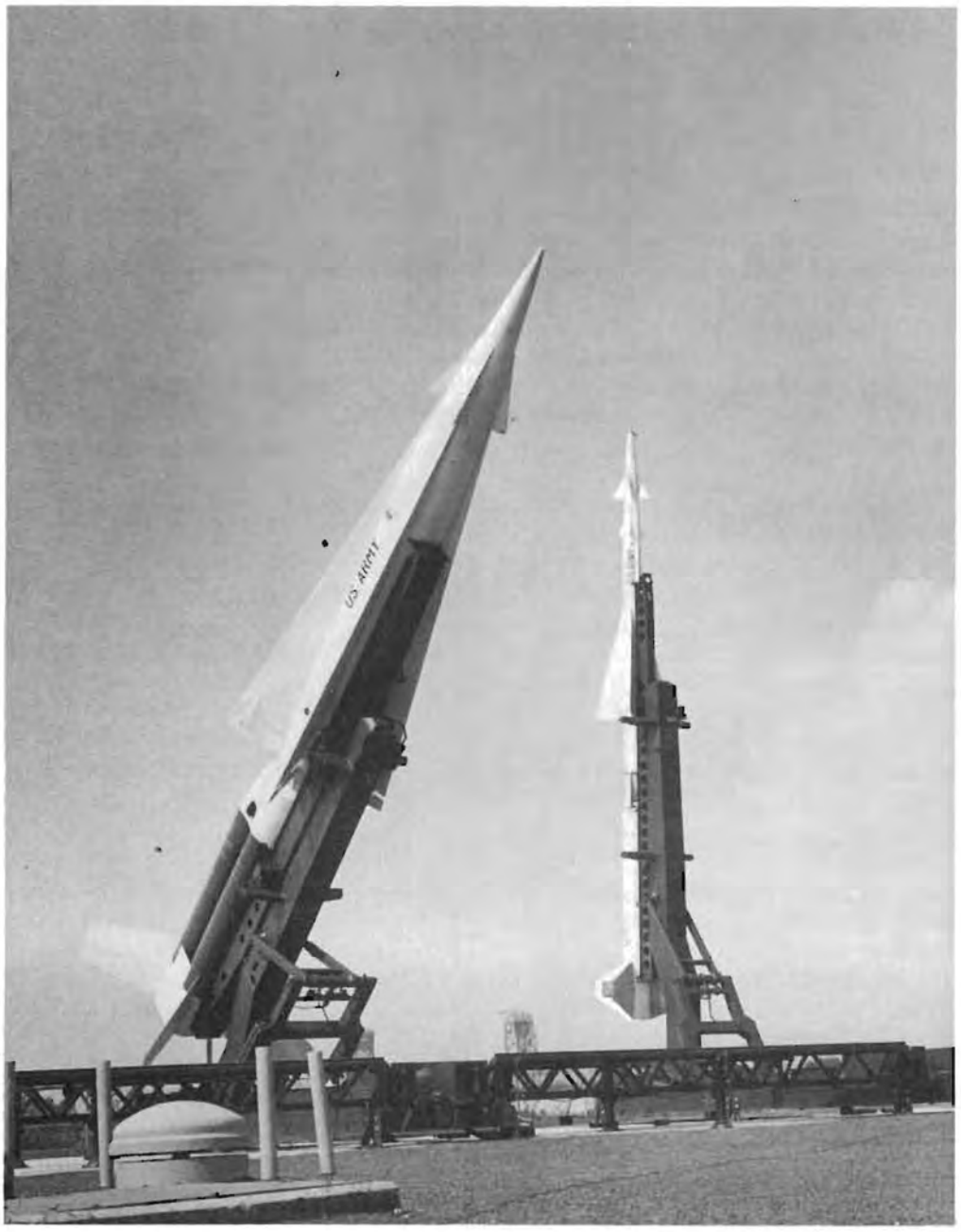
(S) A great improvement began in 1958 with the start of conversion of all regular Army units to Nike Hercules. This missile could carry nuclear warheads and had much greater range, speed, and altitude than Ajax. The first Hercules battery became operational in the U.S. in mid-1958. One Hercules battery became operational at Thule by the end of that year and eight batteries were operational in Alaska by mid-1959. In the U.S., over a third of the total force had Hercules by the end of 1959.

(U) The Air Force's Bomarc missile first became operational in 1959. In September, the first missile squadron (at McGuire AFB, N.J.) became operational with IM-99A's. A second squadron was ready by year's end.

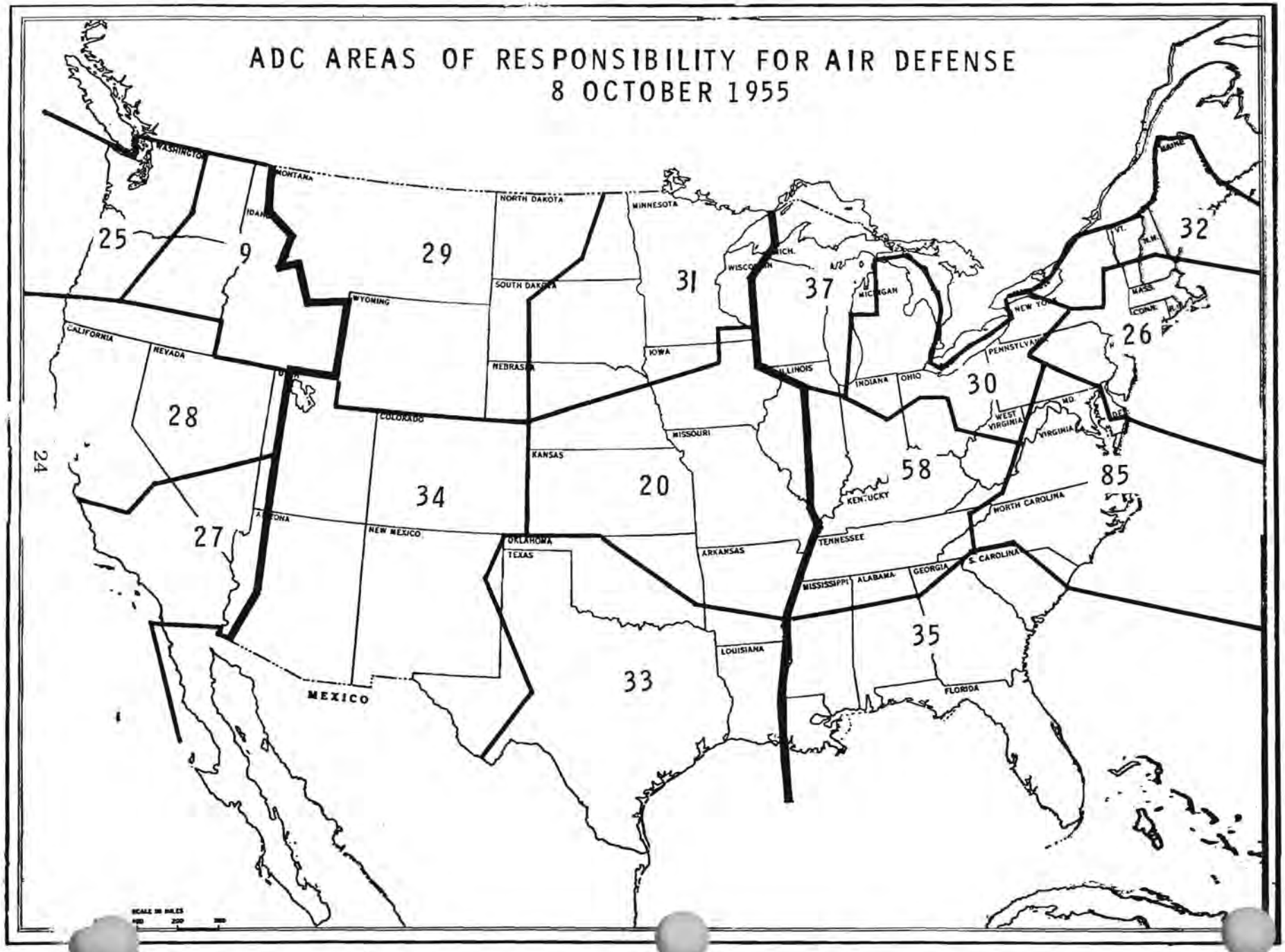
COMMAND AND CONTROL

SAGE

(U) By mid-1951, USAF ADC had established an organization of 11 air divisions and three defense forces. As its system grew beyond the 75 stations



(Left) - NIKE HERCULES (Right) - NIKE AJAX


ADC AREAS OF RESPONSIBILITY FOR AIR DEFENSE
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MONTANA
NORTH DAKOTA
MINNESOTA
WYOMING
SOUTH DAKOTA
CALIFORNIA
NEVADA
IOWA
NEBRASIA
COLORADO
MISSOURI
KANSAS
NEW MEXICO
OKLAHOMA
TEXAS
ARKANSAS
LOUISIANA
MEXICO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
NORTH CAROLINA
S. CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
INDIANA
OHIO
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of the P-system and its fighter forces increased, ADC decided it needed five more divisions for a proper span of control.

(U) In the meantime, work was going on to develop a system to automatize the ground control functions. It had been recognized very early that the manual system of observing, telling and plotting was inadequate. In mid-1950, the Continental Air Command had proposed to USAF a development program for an automatic system. USAF agreed and a number of agencies worked on the problem. The Lincoln Laboratory of M.I.T. developed the system adopted by the Air Force in April 1953, known first as the Lincoln Transition System and later as the Semi-Automatic Ground Environment (SAGE) System.

(U) Under SAGE, not as many divisions would be needed as ADC had thought necessary before. But because SAGE was still some time off, ADC decided to build up to its planned 16 divisions and then reduce gradually to seven divisions which was the number thought needed under SAGE. The increase to 16 divisions was accomplished by October 1955.

(U) The first SAGE sector, New York, became operational on 26 June 1958; the first SAGE region/division, the 26th at Syracuse, New York, became operational on 1 January 1959. In order to provide for SAGE, ADC and NORAD/CONAD began a reorganization of their structures within the U.S. at mid-1958. Boundaries had to be realigned, regions/divisions discontinued, and new SAGE regions/divisions and sectors established or designated. As planned, ADC reduced its structure from 16 divisions to seven divisions by July 1960. Its defense forces were discontinued. NORAD/CONAD established seven regions in the U.S. by that time by eliminating its geographically-designated regions and redesignating seven of its divisions as regions. The U.S. Army Air Defense Command (the new designation for ARAACOM as of 21 March 1957) replaced its three geographically-designated commands with five

regional commands in 1955 and 1956.

4 (S) The CADIN program, mentioned earlier, provided for SAGE in Canada. One SAGE sector was to be located in Canada and others extended into Canada. The SAGE sector, Ottawa, with headquarters at North Bay, Ontario, was to be hardened and serve also as the combat center for the Northern NORAD Region Headquarters.

COMBAT OPERATIONS CENTER

(U) From 1951 to 1954, ADC operated from a tiny, crude combat operations center it installed in one of its office buildings at Ent AFB by combining one room, a latrine with the plumbing removed, and part of the hallway. The first nation-wide air defense exercise, Sign Post, in July 1952, convinced ADC that it was impossible to monitor and supervise the air battle from such small quarters. Before the end of 1952, ADC had gotten authorization and funds from USAF to build a completely new COC.

(U) During late 1952 and early 1953, the functions and design for the new COC were developed on the basis of current and foreseen requirements to meet ADC's mission of defending the U.S. against air attack. To house the new COC, built in an amphitheater arrangement, a blockhouse-type structure was erected next to the headquarters office buildings. On 15 May 1954, operation began in the new center.

4 (S) With the air defense system enlarging rapidly, the threat increasing, the new areas of Alaska and the Northeast coming under the center in Colorado Springs (see Chapter Four), it was not long before this COC was considered inadequate. Much more data had to be processed and displayed much faster and the center had to be made safer from attack. General Earle E. Partridge said that his COC was of such light construction and so exposed that "a man with a bazooka passing in a car could put the establishment out of commission."

U (S) Early in 1956, at the direction of General Partridge, then CONAD/ADC commander, the combined headquarters staff prepared a construction requirement for a new, underground COC. In September 1956, ADC sent a preliminary requirement to USAF for an underground CONAD/ADC COC for the 1960-1967 time period. This was followed in 1957 and 1958 by the development and submission of requirements by CONAD and then NORAD to USAF and the JCS for an underground COC.

U (S) Great impetus was given to the new COC project by the decision in early 1958 by DOD for the Air Force to establish a Ballistic Missile Early Warning System. The BMEWS would require a central computer and display facility. NORAD urged integration of this facility with the new COC to be built underground in the Colorado Springs area. In the background too was consideration of assigning a space detection system to NORAD. After months of study, the Corps of Engineers selected a site in Cheyenne Mountain south of Colorado Springs. On 18 March 1959, the JCS approved the location. USAF was made responsible for the COC project in collaboration with NORAD. In the meantime, it was decided to install an interim BMEWS facility within the existing COC at Ent AFB.

U (C) Work on developing the new COC was halted, however, by USAF in November 1959 pending a complete review.

MANNED BOMBER DEFENSE PROGRAM CHANGES

U (C) As has been shown, during the 1950's, there had been an almost continuous expansion and improvement of the manned bomber defense system. But by 1959, a shifting emphasis from the manned bomber to the ballistic missile threat, budget limitations, and a matching of funds against changing priorities slowed expansion and improvement in terms of what had been planned. In 1959 and early 1960, numerous

changes were made in the programs. Mainly, these changes cut back or cut out new air defense equipment to be used against the manned bomber.

U(S) First off, in June 1959, the Secretary of Defense issued the Continental Air Defense Program (CADP), establishing objectives for continental U.S. air defense. The CADP levels were far below what had been asked by NORAD in its objectives plan for 1959-1963, issued in December 1958, and considerably below what had been programmed by the services. The major CADP levels were these: 44 interceptor squadrons by FY 1963, 16 Bomarc squadrons (29 were programmed at the time), and 139 Nike Hercules batteries.

U(S) Other reductions followed. By the end of 1959, USAF cancelled the F-108 long-range interceptor with which NORAD had planned to equip 20 squadrons, deferred all action on the new hardened COC, cancelled improvements to DEW Line radars, cancelled the requirement for an advanced AEW&C aircraft, and eliminated gap fillers from the Alaskan program. The Navy deferred modernization of its AEW barrier aircraft and announced withdrawal of its picket ships from the barriers in early 1960.

U(S) 1960 brought more cuts. The major items: Bomarc was reduced to eight squadrons in the U.S., USAF interceptor squadrons were to be cut to 42 by the end of 1964, the SAGE super combat center program was cancelled, SAGE integration equipment for AEW&C aircraft (ALRI) was limited to 35 aircraft, and the frequency diversity and gap filler radar programs were reduced.

CHAPTER THREE

INTEGRATION OF THE AIR DEFENSE EFFORT

INTEGRATION PRIOR TO CONAD

(U) To bring the whole picture of air defense development together, it is necessary at this point to turn to an examination of command arrangements. As the air defense forces proliferated and became more advanced and the offensive weapons of the enemy improved, the need for more far-reaching and extensive integration of the air defense forces increased. At the end of World War II, the problem was largely academic because there were hardly any forces to worry about. What integrating that was necessary was carried out by the AAF ADC.

(U) When the Air Force became a separate service it was given the mission of air defense. The Key West Agreement, which resulted from a conference between the Secretary of Defense and the Joint Chiefs of Staff in the spring of 1948, assigned the USAF the mission of providing air defense in accordance with policies and procedures of the JCS. Air defense, thereby, became a unilateral Air Force responsibility; however, the Army and Navy were assigned air defense roles as collateral functions.

(U) Air Force officials recognized that the resources of all the services would be required to defend the nation against air attack. It would be necessary to employ Army antiaircraft weapons and Navy fighter aircraft and radars. The Key West Agreement provided that the Army and Navy would furnish these resources in keeping with JCS policies. But no JCS policies were issued, so ADC had to rely on inter-service agreements for the employment of other service forces. So employment and integration of forces was achieved through means

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of bilateral agreements, i.e., Air Force-Navy, Air Force-Army, ADC-other USAF command, ADC-Navy command, etc.

(U) Of importance was the creation on 1 July 1950 of the Army Antiaircraft Command and the agreement completed a month later between the Army and Air Force setting up arrangements for employment of AA in air defense. This agreement provided that the Air Force air defense commander could establish the states of alert and the basic rules of engagement. And it stipulated that operational control, insofar as engagement and disengagement was concerned, was to be exercised directly by the air defense commander.

COMMAND ARRANGEMENTS FOR AIR DEFENSE CONSIDERED

(U) In the meantime, establishment of a unified organization for air defense in the U.S. was being considered in Washington. In late 1946, the War Department drew up a plan for a joint command. There was considerable difference of opinion, however, and the plan was shelved. In 1948, the Air Force considered establishment of the Air Defense Command as a specified command of the JCS. But there was much opposition from within the Air Force and from ADC to this.

(U) The next serious consideration of reorganization came in 1950 when USAF prepared a plan for a unified air defense command. By this time, the original ADC had been abolished and the mission taken over by the Continental Air Command (ConAC). The latter opposed the USAF plan and proposed a specified command instead. USAF sent the unified command plan to the JCS anyway, but no action was taken. ConAC then recommended that a separate air defense command be set up because of the growth of air defense. USAF agreed and, on 1 January 1951, re-established ADC.

(U) The question of command arrangements for air defense in the U.S. did not come up again until 1953.

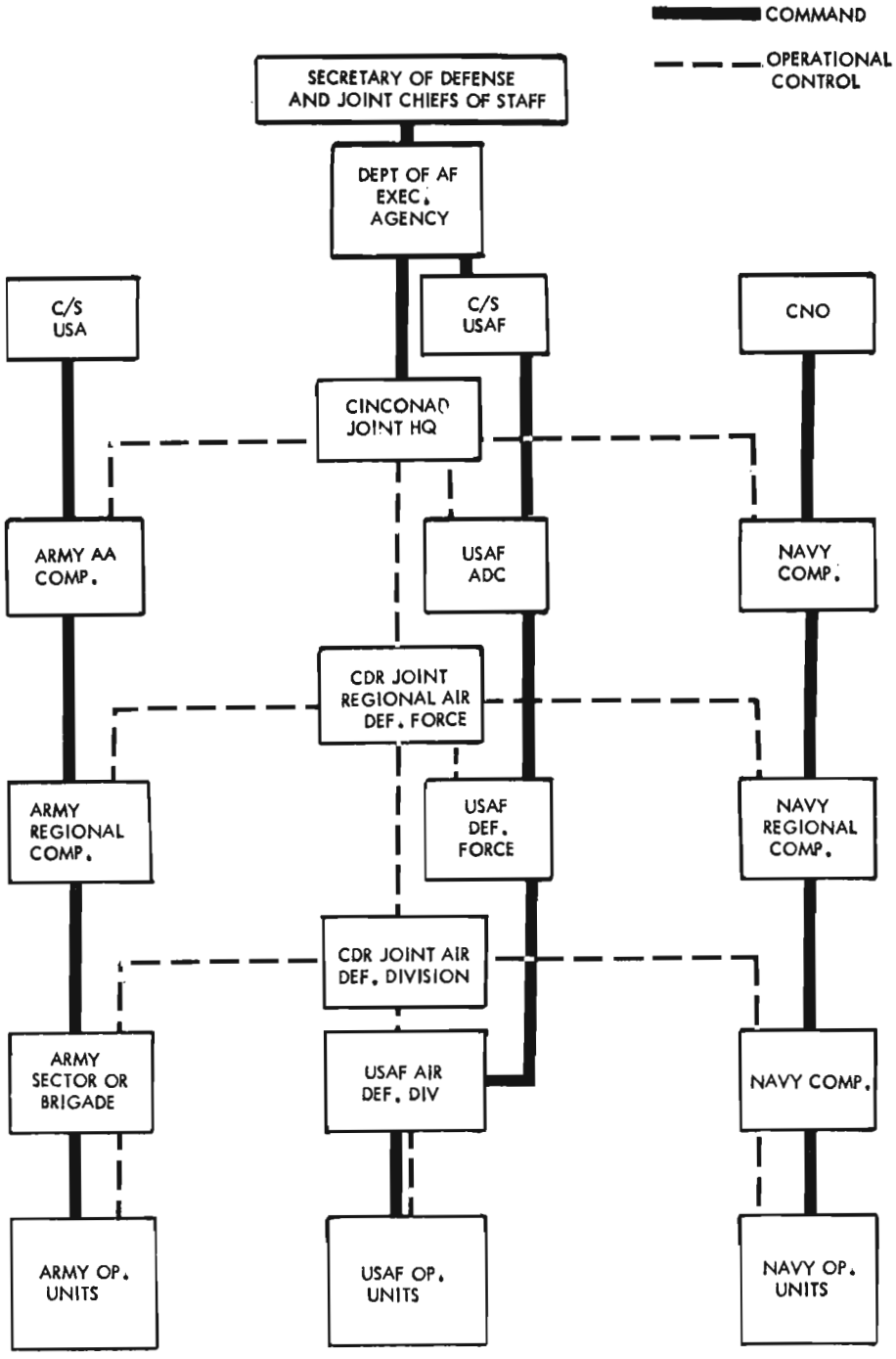
CONAD ESTABLISHED

(U) In August 1953, the JCS asked the Air Force Chief of Staff, General Nathan Twining, to examine the possibility of a JCS command for air defense. General Twining found that the Air Staff, by this time, favored maintenance of the status-quo. It recommended adoption of a plan by which the Air Force Chief of Staff would report to the JCS on air defense matters or a plan for a specified command.

(U) However, both General Twining and Admiral Arthur W. Radford, Chairman of the JCS, believed that U.S. air defense had become far too large and too important for the Air Force to continue to handle alone. Early in 1954, Admiral Radford sent a memorandum to the JCS reminding them that it was required by law that they establish unified commands in strategic areas when such was in the interest of national security. He felt that a JCS command for U.S. air defense was now required. The JCS approved, in principle, and directed the Joint Strategic Plans Committee to prepare terms of reference. The committee reported in March with a difference of opinion as to the degree of responsibility to be given the commander of the new organization and a recommendation that the views of the Army, Navy and Air Defense Command be obtained.

(U) General Benjamin W. Chidlaw answered for ADC with a proposal for a joint command under the JCS with the Air Force as executive agency. "The operating command for air defense must be organized on a geographical basis," he explained, "with subcommands, all having the same mission -- that of air defense of a geographical area." He proposed that joint headquarters be set up at each echelon of the existing ADC structure through air division. The

ORGANIZATION
CONTINENTAL AIR DEFENSE COMMAND
SEPTEMBER 1954



staffs would be the staffs of the current ADC headquarters, plus a small number of Army and Navy personnel, headed by ADC commanders. He proposed that there be three components under the joint command -- ARAACOM, ADC, and a Navy Command yet to be formed. Responsibility for air defense would be given to the joint command, which would have operational control of the forces of the component commands and any augmentation forces. Operational control would be exercised through the joint command's own echelons.

(U) The Navy agreed with ADC. But the Army felt that joint headquarters below command level were unnecessary and that operational control should be exercised through the component commands.

(U) The difference of opinion was eventually resolved, however, in favor of the Chidlaw plan and the JCS directed establishment of the Continental Air Defense Command (CONAD). CONAD was established on 1 September 1954 at Ent AFB, Colorado Springs.

(U) As set up, CONAD was almost identical to the organization recommended by General Chidlaw. CONAD was given the mission "to defend the continental United States against air attack." The Air Force was made executive agency and it was stipulated that CINCONAD would be an Air Force officer. General Chidlaw was named CINCONAD in addition to being the ADC commander. Three components were designated -- ADC, ARAACOM, and Naval Forces Continental Air Defense Command (NAVFORCONAD), the Navy command established at this time. CINCONAD was given operational control of all forces assigned or otherwise made available by the JCS or other authority. This was to include augmentation forces in an emergency.

(U) CONAD was superimposed upon the existing ADC structure. Each ADC headquarters from command down through air division level was additionally designated a joint headquarters (e.g., Joint Western Air Defense Force, 32d Joint Air Division). The

commanders and staffs of the command headquarters, the defense forces, and the air divisions of ADC all assumed dual roles.

INEFFECTIVENESS OF CONAD

(C) But CONAD proved to be very ineffective and two years later was reorganized under new terms of reference. The basic weakness was in CONAD's operational control authority. Operational control was defined as authority to direct the tactical air battle, control fighters, specify conditions of alert, station early warning elements, and deploy the command combat units. This gave CONAD very little authority in matters of integrating forces. Too much was left unsaid and what was said was too general. It left too many areas open to interpretation. What forces were under CONAD operational control? Who was to determine the procedures for conducting the air battle, who was to determine the organizational arrangement for exercising control, and how was operational control to be exercised? These and a hundred other such questions arose immediately.

(U) Another, but related, weakness was in the organizational arrangement whereby CONAD was not really a separate entity. CONAD was nothing more than an additional designation for the USAF Air Defense Command. The commander, vice commander, and all deputies and directors were the same people for CONAD and ADC throughout the organization from command headquarters through joint defense forces and divisions. As an example of how "joint" CONAD was, in June 1955, CONAD Headquarters had 405 Air Force officers and two Navy officers, two Army officers, and one Marine officer.

(U) What was expected was that ADC could function simultaneously as a joint headquarters and a component headquarters. This did not work. The staff officer had difficulty determining whether a function belonged to ADC or CONAD, whether an ADC

or CONAD channel should be used, or whether he should act as an ADC officer or a CONAD officer. This situation was true from command headquarters on down except that recognition of CONAD decreased the further down the echelon.

(U) There is not much to record in the way of accomplishment during CONAD's first two years other than the fact that a beginning was made. The ADC staff made a start toward putting some minor operational control and administrative matters in CONAD's name. After a year of existence, CONAD had issued a total of ten regulations, four of which were on the subject of how to issue publications. The other six covered states of preparedness, reporting of jamming, and funding for the headquarters. On the other hand, eighteen ADC regulations were made applicable to CONAD. Ten more CONAD regulations were issued the next year. These covered the above subjects and rules of engagement and states of alert (it took a year and half, to May 1956, for CONAD to issue a regulation on alert requirements). Thirteen ADC regulations were still being used.

PROBLEM OF WEAPONS INTEGRATION

(U) The basic weaknesses in CONAD showed up in a controversy with ARAACOM over employment of antiaircraft weapons in the SAGE system which was to be implemented soon. This was a central issue, however, involving the whole matter of weapons integration and control and, as it turned out, became a major consideration in the reorganization of CONAD.

U (Ø) In 1955, ADC and the Lincoln Laboratory, which had developed SAGE, studied employment of Army weapons in the SAGE system and recommended centralized control of these weapons from the SAGE direction center. Under this concept, assignment of targets to AA batteries would be by Army personnel at the SAGE DC. ADC felt that only by such integration could the full effectiveness of the overall weapons system be achieved and unified

execution of the mission be assured.

U(C) But the ADC concept was unacceptable to ARAACOM which wanted control decentralized at the direction center level. Being tied to SAGE and limited to SAGE boundaries, ARAACOM felt, would greatly weaken and restrict Army weapons. ARAACOM wanted to have information on targets sent to its AA Operations Center commanders who would decide which targets to take and what batteries to use. The Army was developing its own weapon control system, the AN/FSG-1 Missile Master, for the Nike missile. But this was to be used primarily as an aid in fire distribution among batteries according to the Army concept.

(U) Because ARAACOM and ADC had conflicting views, a CONAD decision was called for. But CONAD could speak with very little authority and since CONAD and ADC were one and the same, CONAD's views were the same as ADC's. At any rate, CONAD prepared several plans, held numerous conferences, and wrote reams of letters. But it caused no solutions to be reached.

U(C) With the number of Nike missiles increasing and the Missile Master and SAGE systems approaching operation, the point was finally reached where the JCS and the Secretary of Defense had to come into the matter. In the spring of 1956, a number of representatives from the Army, Air Force and CONAD made presentations to the Armed Forces Policy Council on the question of CONAD centralized control versus Army decentralized control. CINCONAD, General Earle E. Partridge, told the Council his view was that the air defense battle was a single battle and therefore it was necessary to fight an integrated battle from the point of engagement until the enemy was destroyed. He said he believed the air defense system for CONAD should be based on the integration of firepower of all air defense weapons, a system which employed a single operational channel down to the lowest level where sufficient intelligence information was available to permit a coordinated effort, and a system that eliminated unnecessary

duplication. The Air Force supported CINCONAD's views.

U(C) Following the presentations, it was decided that the JCS should prepare recommendations on command relationships and operational control for air defense and to clarify the authority of CINCONAD. The JCS, it turned out, felt that many of the difficulties CONAD was experiencing were caused by the organizational arrangements and to the wording of the existing terms of reference, especially in regard to operational control. Included in the JCS recommendations was separation of the headquarters of ADC and CONAD.

U(C) Just prior to this time, in April, CONAD itself had submitted a recommendation for separation from ADC. CONAD proposed a separate staff of around 350 (120 officers). Both the Army and Navy component commands had objected to the proposed size of the CONAD staff. The Navy commander suggested that about 30 to 40 officers were all that would be needed. Both asked for increased representation for their services, objecting to the fact that nearly all key positions were proposed for Air Force officers.

U(C) At any rate, on 19 June 1956, the Secretary of Defense approved the JCS recommendations which included new organizational arrangements and a strengthening of the operational control provision for CONAD. The joint staff was directed to revise the terms accordingly. The Secretary of Defense also approved a new Unified Command Plan. Among the provisions of the new UCP, revised by the JCS early in 1956, was to give responsibility for air defense of Alaska and the Northeast area to CONAD.

CHAPTER FOUR

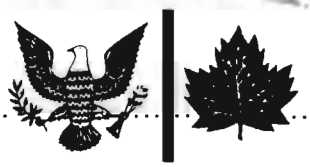
REMODELING OF CONAD

NEW TERMS OF REFERENCE

(U) The first of two major changes to the CONAD structure came in the new terms of reference on 4 September 1956. These terms broadened CONAD's mission, strengthened and clarified its authority, and remodeled its organization. The second major change to CONAD (and NORAD) came in 1959 as a result of the DOD Reorganization Act of 1958 (Chapter Six).

U(C) CINCONAD's mission was broadened in two areas: (1) responsibility for air defense of Alaska and the Northeast Area and (2) responsibility for assisting in air defense of Canada and Mexico according to approved plans and agreements.

U(C) Two changes were made to help strengthen and clarify CINCONAD's authority and responsibility. One was a new definition of operational control. The 1954 terms defined CONAD's operational control as the authority to direct the tactical air battle including the engagement and disengagement of weapons, control of fighters, specify the conditions of alert, station the early warning elements, and locate and deploy the command combat elements. The new terms defined CONAD's authority as those functions of command involving composition of subordinate forces, assignment of tasks, designation of objectives, and direction necessary to accomplish the mission. CONAD's authority included the responsibility to determine procedures for conducting the air battle, for exercising operational control of all assigned forces, and for directing engagement and disengagement of weapons. Finally, a point inserted because of the integration of weapons problem, operational control included authority to centralize operational control of forces,



including the assignment of individual antiaircraft batteries to designated targets.

(U) The second change made to strengthen CONAD and clarify command relationships was separation of ADC and CONAD headquarters. CINCONAD was authorized to set up a separate headquarters with a separate staff. Furthermore, the terms said he could establish such subordinate joint organizations as he deemed necessary to accomplish his mission, including those necessary to permit centralized control and employment of all air defense weapons available. And the terms specifically stated that CINCONAD's joint commanders were responsible for combat operations.

SEPARATE CONAD HEADQUARTERS

(U) CONAD Headquarters lost little time in separating itself from ADC Headquarters. On 17 September, a CONAD staff structure was established and by 1 October, CONAD was physically separated and functioning separately. The CONAD Commander-in-Chief, General Partridge, was relieved of command of ADC on 17 September and Lieutenant General Joseph Atkinson was named ADC commander.

(U) CONAD's proposed manning of 350 for its headquarters was approved. This included 124 officers (85 Air Force, 25 Army, 13 Navy, and 1 Marine Corps). The January 1957 strength report shows 353 assigned. ARAACOM and NAVFORCONAD had opposed a large CONAD staff and also had objected to the near absence of Army and Navy officers in key staff positions. Air Force dominance was defended by General Partridge:

> In determining the composition of the headquarters staff under the terms of reference, due consideration was given to each of the military services and their basic functions. Since air defense planning and operation for the North American continent

requires, during this time period, an intimate knowledge of offensive and defensive aerial warfare, I selected initially Air Force personnel for certain key staff positions. It is my intention to utilize the personnel made available by the three services to the limit of their capabilities with due consideration to rank, experience and forces assigned.

CONAD SUBORDINATE ORGANIZATIONS

(U) CONAD's next effort was toward establishing subordinate organizations as separate as possible and with as much identity as possible. Effective 15 January 1957, CONAD disestablished all of its joint defense forces and joint divisions and replaced them with CONAD regions and CONAD divisions. A total of three regions and sixteen divisions were created at this time.

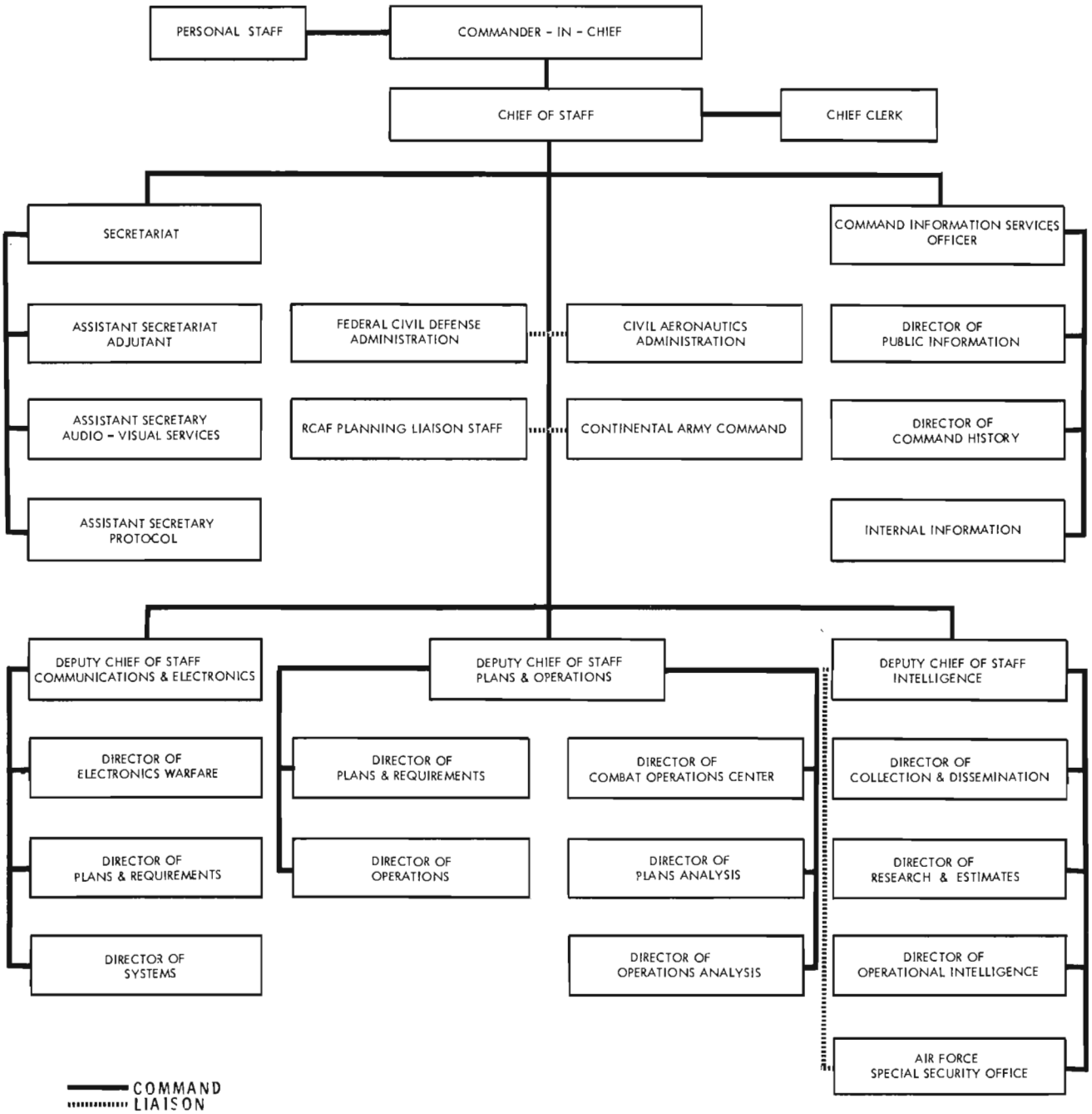
(U) The term "region" was adopted because it was the traditional term for the subdivision of an air defense territory and also it gave the major CONAD subordinate unit a more separate identity. In other words, it set them apart from the ADC defense forces.

(U) Then CONAD stated in a regulation that each region and division was to be organized as an operating agency, separate from the headquarters of each component command. The regulation directed that the commander of each unit was to have a separate joint staff, limited to the number of personnel necessary to perform the command's mission. CONAD division commanders were to exercise operational control over all air defense systems and CONAD forces and units in air defense within their assigned areas.

(U) But, while it directed that separate staffs be formed, CONAD had absolutely no manning authorization to provide its subordinate units. All that

CONTINENTAL AIR DEFENSE COMMAND HQS
ORGANIZATIONAL CHART

SEPT 1956



CONAD could do, for the meantime, was to direct ADC to give its defense force and division commanders the additional job of commanding the CONAD regions and divisions. These commanders had then to appoint their ADC personnel to CONAD positions as an additional duty. Each of the regions did have a few Army and Navy representatives.

CONAD EXERCISE OF AUTHORITY

(U) In the meantime, CONAD Headquarters was beginning to function as a separate, independent organization. It tightened its grip on the management of air defense, moving into one area after another to establish policy and guidance. As told earlier, at the end of CONAD's first two years, it had 20 regulations in effect. Another 29 were added in the first year after CONAD separated from ADC. These directives not only expanded guidance on areas previously covered, such as on augmentation forces, but provided guidance on new areas, such as on exercises and tests. As noted, as of 1 August 1956, just prior to the ADC/CONAD separation, there were still 13 ADC regulations and two manuals being used by CONAD. On 1 April 1957, CONAD announced that no ADC regulation or manual was applicable to Headquarters CONAD or to CONAD field units. The cord was cut.

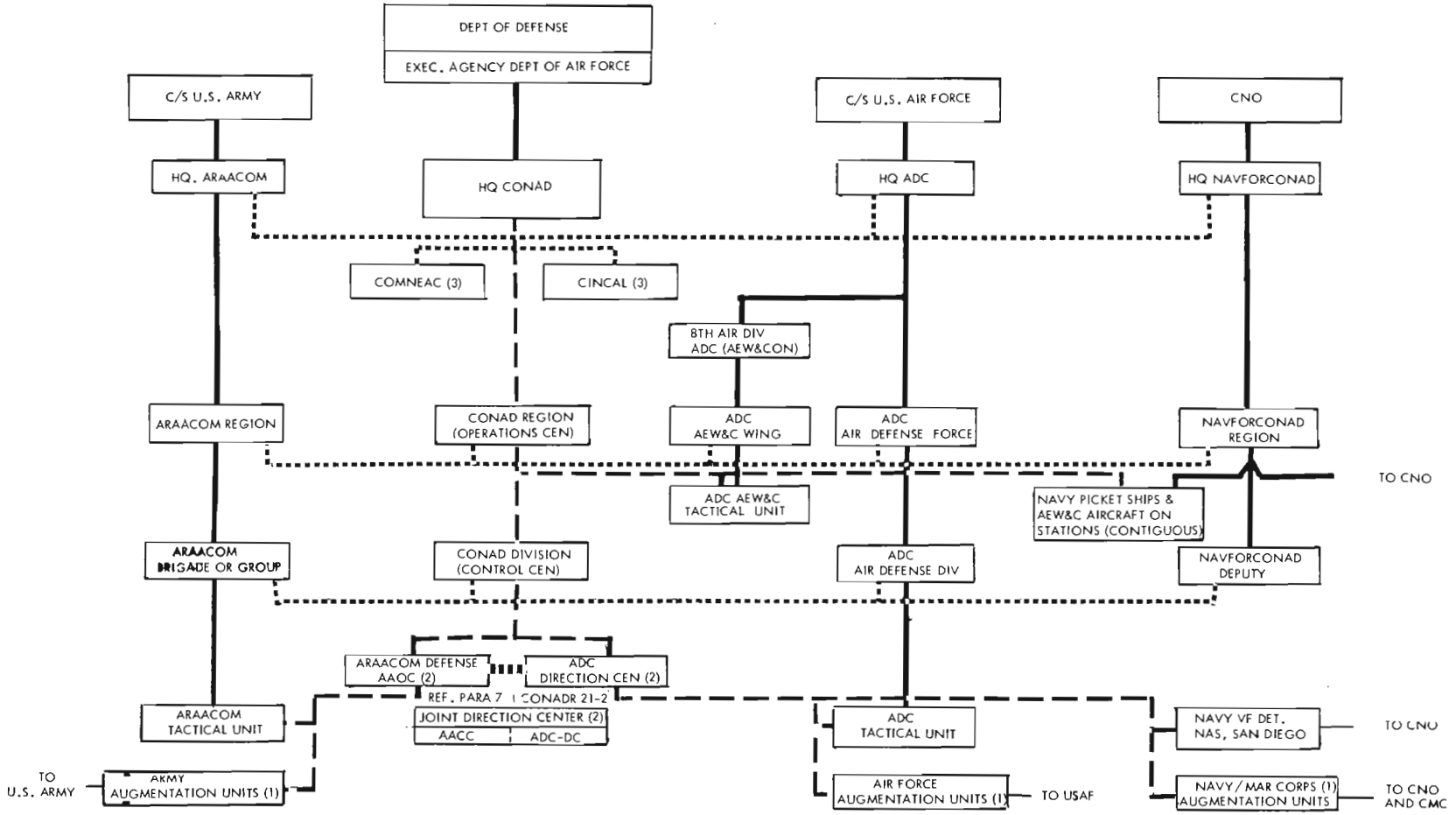
(U) A significant manifestation of CONAD's authority was its ability to bring about collocation and integration of ADC and ARAACOM control facilities. As discussed in the preceding chapter, the problem of employing antiaircraft weapons in the SAGE period had plagued CONAD for nearly two years and had been one of the big considerations in the reconstruction of CONAD.

(U) A plan for antiaircraft weapons employment in SAGE, prepared by CONAD, ADC, and ARAACOM, was acceptable in concept by the Office of the Secretary of Defense, but needed further testing and expansion. One big matter was testing integration of the Air Force SAGE and Army Missile Master.

CONAD HEADQUARTERS BUILDING - 1956

RCAF ADC HEADQUARTERS BUILDING - 1957

ORGANIZATION
CONTINENTAL AIR DEFENSE COMMAND
SEPTEMBER 1956



NOTES

(1) UNDER OPNL CONTROL OF CINCONAD WHEN COMMITTED ONLY

(2) OPERATIONAL CONTROL OF COMBAT ELEMENTS AS DESIGNATED BY DIVISION CMDR

(3) DETAILS OF COMMAND RELATIONSHIP ISSUED SEPARATELY.

COMMAND
CONSULTATION & INTERSTAFF PLANNING
OPERATIONAL CONTROL
COORDINATION

U (S) In a review of the whole subject, CONAD saw that because the Missile Master would be coming in ahead of SAGE, the most immediate problem was to find a method of integrating the Missile Master into the manual air defense system. CONAD concluded that the operation of the ADC interceptor control system, the AN/GPA-37, could be integrated with the Missile Master at the same location. A plan for such collocation at ten sites (the number of Missile Masters on order) was then developed by CONAD. Both the Army and Air Force accepted the CONAD plan and on 30 October 1956, the Office of the Secretary of Defense concurred in this collocation.

U (S) CONAD now proceeded to carry out integration, a milestone in establishing centralized control over the air defense system under one commander, a major raison d'etre of CONAD. The first guidance was in a letter to ADC and ARAACOM in December 1956 which directed collocation of the ADC direction centers and Army Missile Masters at facilities to be designated CONAD joint control centers. CONAD said it would "exercise operational control and coordinate the air defense efforts of all participating air defense units. The means ... will be a joint center responsible to CINCONAD through the CONAD operational chain." Collocation and integration was later expanded to include non-Missile Master Army command posts with associated Air Force direction centers.

CONTROL OF ALASKAN AND NORTHEAST AIR DEFENSE

U (S) While this activity was underway, CONAD was taking over responsibility for air defense of the Northeast Area and Alaska as assigned in the 1956 terms. The U.S. Northeast Command, a JCS unified command, was disestablished by the JCS on 1 September 1956 in accordance with the Revised Unified Command Plan. On this date, CINCONAD took over responsibility for air defense of the Northeast.

CINCONAD designated the Commander, Northeast Air Command (NEAC), as his subordinate joint commander responsible for air defense in this area. This arrangement lasted only until 1 April 1957 when NEAC was also abolished. CONAD established the 64th CONAD Division on this date and designated its commander as the CONAD subordinate commander in the area. This was simply an additional designation given to the 64th Air Division which had been established under NEAC in 1952. With the abolition of NEAC, USAF ADC took over command of the USAF forces in the area and the 64th Air Division. Earlier, on 1 September 1956, the antiaircraft group in the area, the 7th at Thule, was transferred from First Army to ARAACOM.

(S) Meanwhile, on 1 September 1956 also, CONAD assumed operational control of all air defense forces in Alaska. CINCONAD designated Commander-in-Chief Alaska (CINCAL) as the commander responsible to him for all air defense activities in the area. He delegated to CINCAL the authority to exercise operational control of Alaskan air defense forces. CINCAL's control was to continue to be exercised through Commander, Alaskan Air Command (the Air Force component command of ALCOM). The antiaircraft forces in Alaska remained assigned to U.S. Army Alaska.

CHAPTER FIVE

CANADIAN-U.S. INTEGRATION OF FORCES

PRE-NORAD COORDINATION

(U) Close air defense coordination had long been maintained by Canada and the United States. In 1949, the Canada-U.S. Military Cooperation Committee (established at the end of World War II) prepared a plan for emergency defense that outlined the major joint actions necessary and principles of common defense operations. Among other things, the plan, which was approved by the U.S. JCS and the Canadian Chiefs of Staff Committee, called for preparation of detailed emergency air defense plans by the air defense commands of the two countries. The first of such joint plans prepared by RCAF ADC and USAF ADC was issued in 1950. New ones followed each year.

(U) A later Military Cooperation Committee plan authorized exploratory planning beyond the limits of the MCC plan. As a result, a combined air defense planning group was formed and met for the first time in May 1954 with the aim of arriving at the best North American air defense. The commanders of the two ADC's agreed a short time later to establish this group with a permanent staff. It was then moved to Colorado Springs.

(U) The need for integrated planning had been given a boost in May 1954 by the appearance, some two years earlier than expected, of high performance Soviet jet bombers. The joint planning group declared that Soviet jet bombers and thermonuclear capability made it apparent that "consideration of the defense of Canada and the United States separately was unrealistic."

(U) Early in the fall of 1954, the two ADC

commanders directed the joint planning group to prepare a plan for the best single air defense of the two countries. The plan that resulted proposed an integrated air defense of Canada and the U.S., with forces of both countries operating under a single commander responsible to both governments.

U (S) In preparing this plan, the planning group answered for itself the question of what was wrong with the coordinated system of defense currently in existence:

> The answer is that forces deployed to defend against attack from one direction (for instance from the North) are not now under one commander, which imposes serious practical limitations in day-to-day training and in our capability to conduct a properly coordinated air battle in case of actual attack.

(U) The completed plan was presented to Canadian and U.S. military authorities. While no direct action was taken on this plan, it was important in the overall considerations at this time.

NORAD ESTABLISHED

U (C) In December 1955, the U.S. Air Force Chief of Staff proposed to the other members of the JCS that they approve in principle a statement of the desirability of establishing a combined Canadian-U.S. air defense command. The JCS approved, in principle, the need for peacetime integration of the two air defense forces and they asked the Canadian military chiefs for their views.

U (C) The latter replied that it would be desirable to study methods of integrating the operational control of the air defense forces. They suggested that an ad hoc group of representatives of both

countries be formed to make the study.

U (C) The U.S. agreed and the job was given to the Canada-U.S. Military Study Group (MSG). The latter created an ad hoc group to actually make the study. Near the end of 1956, this group completed its work, recommending air defense integration. The MSG approved the recommendations and in its Eighth Report recommended that the JCS and COSC get approval of their governments for integration.

U (S) The JCS approved the MSG Eighth Report in February 1957 with the understanding that integration of operational control would be limited to the continental elements of air defense of both countries. This included the continental portions of the warning systems and the contiguous radar coverage. This was followed by approval by the Secretary of Defense. The COSC advised in May that they had completed action on the report and that the matter awaited governmental approval.

(U) On 1 August 1957, an announcement was made jointly by the Canadian Minister of National Defence and the U.S. Secretary of Defense that the two governments had agreed to the setting up of integrated operational control of the air defense forces of the two countries under an integrated command.

(U) CINCONAD then recommended that this command be set up immediately. General Partridge proposed that the Canadian Chiefs issue an order stating that effective 12 September 1957, operational control of the RCAF ADC would be assumed by the integrated headquarters at Colorado Springs. General Partridge pointed out that very soon there could be a Canada-U.S. command in fact as well as in name for the Canadian officer who was to become Deputy Commander-in-Chief, Air Marshal C. Roy Slemon, was to arrive shortly and there were already several Canadian officers at CONAD Headquarters.

General Partridge also recommended the name North American Air Defense Command, abbreviated NORAD.

(U) The Canadian Chiefs agreed to these recommendations on 3 September; the JCS on 6 September. CONAD then advised its component commands, the RCAF ADC, USAF and RCAF Headquarters, and CONAD subordinate commands that:

> ...operational control over the Canadian Air Defence Command and the air defense force assigned, attached, or otherwise made available to that command will be assummed by the Commander-in-Chief, North American Air Defense Command with headquarters at Ent AFB, Colorado, U.S.A., effective 0001 Zulu 12 September 1957.

(U) The Department of the Air Force assigned General Partridge as CINCNORAD with no change in duty as CINCONAD effective 12 September 1957.

(U) Thus, as of 12 September 1957, NORAD was established; all North American air defense forces were now integrated under one command. It was not until eight months later, 12 May 1958, that the U.S. and Canada concluded a formal agreement for NORAD through an exchange of notes. The Canadian note proposed certain principles for the organization and operation of NORAD, much in line with the MSG Ad Hoc Committee Report mentioned above. Included were the following:

(1) CINCNORAD would be responsible to the JCS and COSC and would operate within an air defense concept approved by the two governments;

(2) operational control was the power to direct, coordinate, and control the operational activities of forces available;

CINCNORAD, GENERAL E. E. PARTRIDGE, AND DEPUTY CINCNORAD, A/M C. R. SLEMON SHORTLY AFTER NORAD WAS FORMED.

(3) the appointment of CINCNORAD and his Deputy, who were not to be from the same country, was to be approved by both governments;

(4) NATO was to be kept informed of arrangements for North American air defense through the Canada-U.S. Regional Planning Group; and

(5) NORAD was to be maintained for a period of ten years or such shorter period as agreed by both countries.

(U) The U.S. note agreed to the principles in the Canadian note and stated that the U.S. reply constituted an agreement between the two governments effective 12 May 1958.

(U) Following this exchange of notes, the military chiefs of both countries approved terms of reference for NORAD which became effective 10 June 1958.

TERMS OF REFERENCE

(U) The terms gave NORAD the mission of defending the continental U.S., Canada, and Alaska against air attack. NORAD was established as an integrated command and was to include as component commands the RCAF ADC, ARADCOM, NAVFORCONAD, and USAF ADC. CINCNORAD was to be responsible to the U.S. JCS and the Canadian COSC. NORAD was to operate within an agreed Canadian-U.S. concept of air defense and in accordance with agreed joint intelligence.

(U) CINCNORAD was given operational control over the component commands and their assigned forces, the air defense forces in Alaska, and all other air defense forces made available by proper authority. Operational control was defined as the power of directing, coordinating, and controlling the operational activities of available

forces (which was in accordance with the definition in the Canadian note agreed to by the U.S.).

(U) CONAD remained in existence to serve as a U.S. national command. It was needed, the JCS advised, to handle U.S. responsibilities outside of NORAD's jurisdiction. The JCS also put into effect new terms of reference for CONAD on 10 June 1958.

(U) NORAD established subordinate units throughout its area of responsibility. In Alaska, in the Northeast Area, and in the U.S., NORAD regions were established at the same locations and with the same boundaries and staffs as the CONAD units. A region in Canada was established, Northern NORAD Region, with the same territory and staff as RCAF ADC. In all, NORAD established five regions and 23 divisions.

CHAPTER SIX

ENLARGEMENT OF NORAD / CONAD AUTHORITY

DOD REORGANIZATION ACT OF 1958

(U) A second major strengthening of CONAD/ NORAD authority was provided by legislation that reorganized the U.S. Department of Defense. This act, which became law on 6 August 1958, had been requested by the President.

(U) The President told Congress it was absolutely essential that there be complete unity in strategic planning and basic operational direction. It was mandatory, he declared, that the initiative for this planning and direction not be with the separate services, but with the Secretary of Defense and his operational advisors, the JCS. The President asked that command channels be cleared so that orders could go directly from the President and the Secretary of Defense to the commanders of the unified commands.

(U) The current set-up was cumbersome and ineffective, he said. Accordingly, he directed the Secretary of Defense to discontinue use of military departments as executive agencies for unified commands. He asked that the fighting forces be organized into operational commands that were truly unified.

(U) The DOD Reorganization Act provided that unified and specified combatant commands would be established by the President with the assistance of the JCS through the Secretary of Defense. Such commands were to be responsible to the President and Secretary of Defense for the strategic missions assigned to them by the Secretary of Defense with the approval of the President. The President would

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also determine the force structure of these commands. The forces were to be assigned by the service departments. These forces were then to be under the full operational command of the unified or specified commander. No forces could be removed except as authorized by the Secretary of Defense.

(U) A new DOD Functions Directive was issued on 31 December 1958, putting into effect the provisions of the reorganization act. A new unified command plan was issued by the JCS on 8 September 1958 which made CONAD a unified command (it had been called a joint command up to that time).

(U) New terms of reference for CONAD, made effective 1 January 1959, provided that CINCONAD was the senior U.S. officer in Headquarters NORAD.* CINCONAD's mission was essentially the same as prescribed in the preceding terms: defending U.S. installations in Greenland against air attack, assisting in the defense of Mexico in accordance with approved plans and agreements, handling purely national matters pertaining to air defense and supporting other commands in their missions. CINCONAD was to exercise operational command over all U.S. forces assigned, attached or otherwise made available.

(U) Operational command was defined early in 1959 as the following:

> Those functions of command over assigned forces involving the composition of subordinate forces, the assignment of tasks, the designation of objectives, the overall control of

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*(U) The CONAD terms were rescinded in February 1961 as no longer necessary and guidance and instructions provided after that by the JCS Unified Command Plan and other periodically-issued JCS directives and instructions.

assigned resources, and the full authoritative direction necessary to accomplish the mission.*

(U) The executive agency control system was discontinued as directed by the President. On 1 January 1959, executive agency control by USAF over CONAD was ended and control was transferred to the JCS. On this same date also, the first assignment of forces to CONAD was made.

HEADQUARTERS REORGANIZATION

(U) Following issuance of these directives, a plan was prepared in Colorado Springs to reorganize the NORAD/CONAD headquarters to assume the new responsibilities and functions, such as in logistics. The first plan divided the headquarters into a NORAD and a CONAD staff, each with a chief of staff and four deputies. This was dropped as too cumbersome and a new plan prepared that merged NORAD/CONAD into one headquarters with seven deputies. The U.S. members of the combined staff were to handle business that was strictly CONAD.

(U) The seven-deputy staff proposed by this plan was modeled after the joint staff of the JCS. The JCS joint staff had six "J" staff sections and a joint programs office. The NORAD/CONAD staff was to have six "J" sections and a deputy for programs.

U(Ø) This plan was approved by the JCS in a

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* U(Ø) One line was later deleted from this definition: "the overall control of assigned resources." Also, it was added that those functions did not include such matters as administration, discipline, internal organization and unit training, except when a subordinate commander requested assistance.

memo dated 23 June 1959. But they authorized a personnel increase of only half of the number requested. At that time, NORAD/CONAD was authorized 445 spaces (which included 35 Canadian spaces). A total authorization of 936 was asked, or an increase of 521. The JCS authorized an increase of 223 for a total of 668. Most of the additional people were to come from the component commands.

U(C) In the plan approved by the JCS, it was stated that the NORAD/CONAD functions included the following:

1. The establishment of qualitative and quantitative requirements for all forces, weapons and equipment for air defense of the North American continent.

2. Planning for the deployment and redeployment of assigned forces and forces to be made available.

3. The establishment of tactics, procedures, and methods for exercising operational control of forces assigned, attached or otherwise made available and for directing the engagement and disengagement of weapons; recommending plans for the operational use of all allocated forces, weapons and equipments and making recommendations concerning present and/or proposed North American air defense concepts.

4. Making recommendations concerning the technical compatibility of all air defense systems and the proper time-phased integration of new or modified weapons into the air defense environment.

U (C) The JCS advised that personnel functions of CONAD, with respect to the components, were limited to the establishment of policies to insure uniform standards of military conduct. Direct training responsibility was limited to joint training. NORAD/CONAD functions in weapons and environment systems

development and testing were to be limited to preparing qualitative and quantitative requirements, making recommendations for resolution of unsatisfactory situations to the JCS, and working with the service with development responsibility to include representation at operations test conferences, provision of observers during test operations, and review of test reports.

(U) A committee formed to put the reorganization plan into force agreed to the following guidelines. In the areas of Personnel (J-1), Logistics (J-4), and Programs, the headquarters would concern itself only with monitoring and providing broad command guidance and policy. This was not true in the remaining J staff areas -- Intelligence (J-2), Operations (J-3), Plans and Policy (J-5), and Communications and Electronics (J-6). The latter areas were considered to be of primary concern to NORAD/CONAD.

(U) General Partridge approved the committee's plan including the phased build-up of personnel, and on 3 August 1959, the new seven-deputy organization went into effect. Separate general orders established the staff structure for NORAD and CONAD. They were identical except for the position of Deputy Commander-in-Chief on the NORAD staff.

PROVISION FOR INCREASED AUTHORITY OVER COMMAND AND CONTROL SYSTEMS

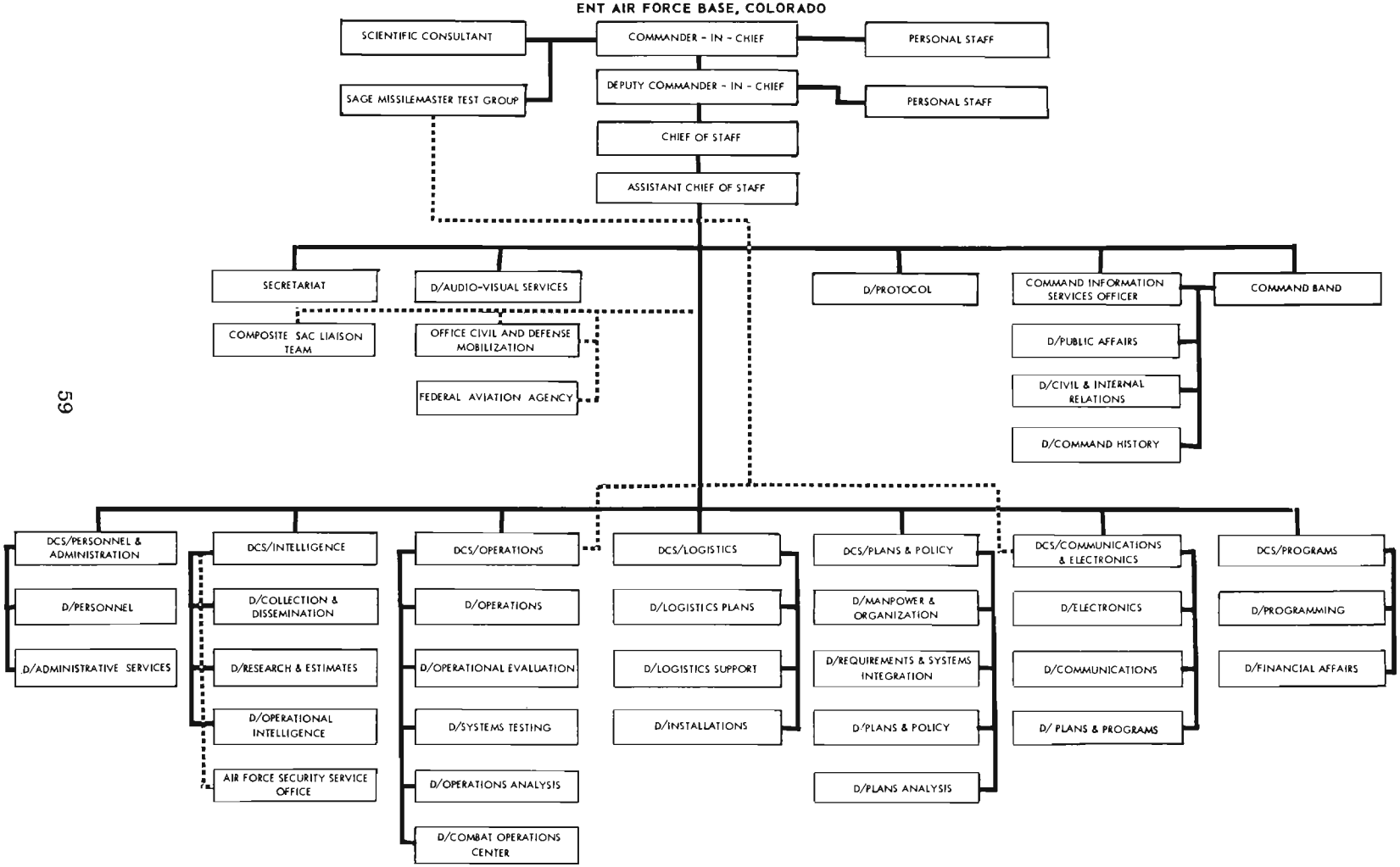
(U) A significant strengthening of the authority of unified and specified commands in the area of command and control systems was provided by the Secretary of Defense in late 1963. In a memorandum on 26 October, the Secretary of Defense provided for ensuring that unified and specified commanders could achieve adequate influence over the development, acquisition, and operation of their command and control systems. This provision for increased authority was spelled out in eight assignments to these commanders. Included was authority to establish operational requirements, participate in

HEADQUARTERS

NORTH AMERICAN AIR DEFENSE COMMAND
CONTINENTAL AIR DEFENSE COMMAND

ENT AIR FORCE BASE, COLORADO

AUGUST 1959



planning and design, review system documentation prior to contract negotiation, identify those elements that should be under the commander's direct command and control, establish certain regulatory procedures, and attach the command's views to program change proposals.

(U) The secretaries of the military departments were to notify appropriate agencies of these assignments and make any modifications in management relationships necessary. This was to include provision for direct contact between the unified and specified commanders and the military departments supporting them on the development and acquisition of their command and control systems. The service secretaries were also to provide for getting the views of the commanders on all plans, designs, specifications, and other documentation affecting the command and control system.

ESTABLISHMENT OF REGIONS AND SECTORS

(U) A final matter to be considered in this chapter is establishment of separately-organized NORAD/CONAD subordinate organizations. When CONAD was formed in 1954, it was superimposed on the existing USAF ADC structure from command headquarters down through division level. Later, CONAD Headquarters was separated from ADC Headquarters. But the situation remained the same below the command headquarters level: ADC subordinate organizations served as the CONAD organizations and, later, the NORAD organizations as well.

(U) In January 1957, CONAD renamed its joint defense forces "regions" and dropped the word "joint" from its division designations. Then in June of that year, it sent a proposed manning plan for its regions and divisions to the JCS. This was an ill-conceived plan mainly because it was premature. It required a large number of people and provided for the three U.S. regions and 16 U.S. divisions then

in existence. CONAD was on the eve of reorganizing its structure to provide for SAGE which would require more regions, elimination of divisions, moving of headquarters and boundaries, etc.

(U) The problem was recognized, however, and almost immediately, NORAD recalled the plan. Then came the reorganization act of 1958 and attention was concentrated on reorganizing the NORAD/CONAD Headquarters. Not until this was completed did NORAD/CONAD turn back to the problem of organizing its subordinate commands.

(U) During 1959 this was worked on and in February 1960, a second organization and manning plan was submitted to the JCS. It covered only the regions on the U.S. mainland and did not mention sectors. Alaskan Region was left to the desires of the Commander-in-Chief Alaska, and Northern NORAD Region was organized separately.*

U (C) Again a reorganization of the command structure intervened. A month after the plan was submitted, USAF Headquarters announced a drastic reduction in programmed air defense equipment (Chapter Two). Among these was cancellation of the improvement to SAGE, the SAGE Super Combat Center. Because of the latter, NORAD revised its plan. Among the changes was reduction to six regions in the U.S. The JCS also asked for the proposed sector organization.

(U) A new plan, which included the sectors, was submitted on 28 October 1960. It covered six regions and 21 sectors planned for the CONUS.

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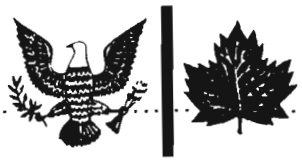
* (U) An Alaskan NORAD/CONAD Region Headquarters was organized on 1 February 1962, staffed on dual-capacity basis. All positions, except that of the commander (CINCAL), were manned by AAC and USARAL personnel.



(U) The JCS approved this plan and the new headquarters were established on 1 August 1961 as what might be described as semi-separately-organized commands. NORAD/CONAD regions were to have integrated joint staffs, but a number of dual-role, defense force-region, positions remained. For one thing, because of the shortage of general officers, there remained a dual-role arrangement for the region command positions. The region commander, by prior agreement with and approval by CINCNORAD, could be additionally designated as the commander of his service component. In one region, the 28th, an Army general officer was appointed commander. He also commanded the 6th ARADCOM Region. The other five CONUS regions were commanded by USAF general officers. The deputy commander positions at the region were made additional duty slots for component commanders of a service other than that of the commander and were not carried on the NORAD Joint Table of Distribution. In the 25th, 29th, and 30th Regions, Canadian officers were appointed second in command and named vice commanders. A U.S. deputy commander position was then established under the vice commander in these regions. The new region headquarters were small, containing only one major staff section, that of deputy for operations, and offices for information and administration.

(U) In the sector headquarters, the dual-role arrangement was carried out for most of the staff. USAF ADC sector officers were used extensively in additional duty designations from commander on down.

CHAPTER SEVEN
THE CHANGING FORCE - 1959 - 1965

(U) The first half of the 1960's saw considerable reorientation of the air defenses as a result of changes in the threat, shifts in priorities, new concepts, and budget limitations. Manned bomber defenses were cut back, steps were taken to make the system more survivable and flexible, a ballistic missile early warning system and a space surveillance system were brought into operation, and there were two satellite intercept systems operating.

(U) The changes in the manned bomber defense system were explained by Defense Secretary Robert S. McNamara in a statement to the House Armed Services Committee on 18 February 1965:

> Our present system for defense against the manned bomber attack was designed a decade ago when it was estimated that our opponent would build a force capable of attacking the U.S. with many hundreds of long-range aircraft. This threat did not develop as estimated. Instead, the major threat confronting the United States consists of ICBM and submarine-launched ballistic missile forces. ... During the last four years, we have made some progress in reorienting the anti-bomber defenses to the changing character of that threat. The vulnerability of the system is being reduced by providing an improved backup to the SAGE system and by dispersing the manned interceptors. Marginal and obsolete units have been eliminated from the forces and new and more effective systems are being introduced. This effort will continue during the FY 1966-1970 program period.

A survey of major elements of the changing force follows.*

MANNED BOMBER DEFENSE

SURVEILLANCE

U (S) The total number of prime radars from 1959 to 1965 varied only a little, but there were many changes. For one thing, many new radars had been added, but there were offsetting reductions. For example, in a two year period, from January 1963 to January 1965, 25 long-range radars were phased out: 18 in the CONUS, four in Canada, and three in Alaska. More cuts were coming. All of the radars of the early 1950's had been phased out. The current radars were either frequency diversity types or had received ECCM improvements. The number of SAGE-integrated radars increased from 49 at the end of 1959, all in the CONUS, to 135 at the end of 1964, of which 28 were in Canada.

U (S) Gap filler radars were cut back considerably. Furthermore, an improved radar, the AN/FPS-74, planned for most sites, had been cancelled in January 1964 following an inordinate delay in production.

U (S) In the off-shore contiguous force, the AEW&C stations had increased from seven in 1959 to ten in 1964 and the four-station ALRI program had been implemented on the East Coast. The three Texas Towers were gone. One collapsed in a storm in January 1961, another was deactivated in January 1963 because of possible danger to it, and the third was closed in March 1963 with the coming into operation

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* (U) To maintain brevity, many important matters had to be omitted such as developments in communications, especially AUTOVON, interceptor flushing and dispersal, region/sector reconfiguration, etc.

MANNED BOMBER DEFENSES
1959 TO 1965

		DECEMBER 1959	APRIL 1965
SURVEILLANCE			
Prime Radars Total	-	188	178
CONUS	-	134	127
Canada	-	35	35
Alaska	-	18	15
Thule	-	1	1
Gap Fillers Total	-	114	89
CONUS	-	108	89
Canada	-	6	0
AEW&C Stations	-	7	10
East Coast	-	3	4 (ALRI)
West Coast	-	4	5
Key West	-		1
Picket Ship Stas.	-	10	8
AEW Airship Stas.	-	1	0
Texas Towers	-	3	0
DEW Line Stations	-	57	29
Aleutian Ext.	-	6	6
Greenland Ext.	-	0	4
Atlantic Barrier	-	4 DERs & 4 AEW	2 Acft Stas.
Pacific Barrier	-	5 DERs & 4.5 AEW	1 AEW
Mid-Canada Line	-	98 Stas.	0
WEAPONS			
Interceptors (Reg.)	-	67 Sqdns	42 Sqdns
Missiles			
Hercules (RA)	-	84 FU	95 FU
Hercules (ARNG)	-	0	48 FU
Ajax (RA)	-	138	0
Ajax (ARNG)	-	36	0
Bomarc	-	2 A Sqdns	8 B Sqdns
Hawk (RA)	-	0	8 FU
SAGE			
Combat Centers	-	2	6
Direction Centers	-	9	16
CONTROL CENTERS	-	1	32

of the first ALRI station. The Navy blimp AEW squadron that began manning an East Coast station in 1957 was pulled out of the force in 1960. In 1965, the Navy picket ships were being withdrawn.

U(S) * The early warning system was being greatly reduced. The system had been completed in 1961. The Eastern or Greenland, four-station DEW Line extension came into operation in August (the Aleutian extension had been operating since April 1959). The Greenland-Iceland-United Kingdom barrier was established in 1961 and the old barrier from Argentia to the Azores discontinued. But even before this, in the spring of 1960, there was a reduction. The Navy took its pickets ships off DEW Line barrier patrol with air defense as a primary mission. In July 1963, the 28 DEW Line Intermediate Stations were shut down. Changes in the threat and modifications to other radars made the low altitude coverage of these stations unnecessary. The following January, Canada shut down the western part of the Mid-Canada Line consisting of five section control stations and 51 doppler detection stations. This was done for economy reasons on the basis that the low altitude requirement had lessened and because of coverage from new long-range radars installed in Western Canada. On 31 March 1965, the remainder of the Mid-Canada Line ceased operation. In the meantime, by the end of 1964, the Secretary of

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* (U) In a statement to the House Armed Service Committee in February 1965, Defense Secretary McNamara explained that systems had been built to provide early warning of a bomber attack through the northern approaches and around the flanks, "But in any deliberate, determined attack ... we can assume that the enemy would strike first with his missiles and then with his aircraft. Thus, the arrival of the missiles would, in itself, signal the attack long before the bombers could reach their targets. As a result, large portions of the existing surveillance, warning and control system constructed during the 1950's are either obsolete or of marginal value to our overall defense."

Defense had approved the phase-out of the remainder of the Navy DEW Line sea barriers and, as noted above, the pickets ships from the contiguous coverage, all by the fall of 1965.

WEAPONS

U (S) NORAD's interceptor force decreased numerically from a peak of 86 squadrons at the end of 1957 to half that number, 43 by the end of 1964. However, during this period, all sub-sonic aircraft were phased out of the regular force. USAF ADC completed conversion to supersonic aircraft by the end of 1960 (leaving it with F-101's, F-102's, and F-106's). Two squadrons of F-104's were added in 1963, one in Texas and one in Florida, to meet the requirement for a high performance plane to combat the MIG-21 threat from Cuba.

U (S) The Alaskan Air Command phased out the one F-89 squadron it had in late 1960, leaving one F-102 squadron. To bolster Alaskan defenses, following Russian overflight of part of the Alaskan Region, eight F-106's from ADC were temporarily deployed to Alaska beginning in July 1963.

U (S) The RCAF ADC's nine CF-100 squadrons were replaced with five squadrons of CF-101's, all of which were operational by the end of 1962. Sixty-six F-101's were transferred from the USAF to the RCAF under the terms of a June 1961 agreement by which the RCAF assumed manning, operation, and maintenance of radar stations in Canada. Two of the CF-101 squadrons were disbanded in 1964 at the direction of the Canadian government. The strength of two of the remaining squadrons was increased to 18 aircraft with planes from the disbanded squadrons. In August 1963, the U.S. and Canada reached agreement for provision of nuclear warheads to Canadian forces, thus making it possible for the CF-101's and Bomarc CIM-10B's to be armed with nuclear weapons.

U (S) In addition to the regular force, Air National Guard interceptor squadrons provided a first-line, Category I, augmentation force. Beginning in mid-1961, this force, consisting of 25 squadrons, went on 24-hour alert under NORAD control. Four of the Category I squadrons were converted to other missions and taken from NORAD control in 1964.

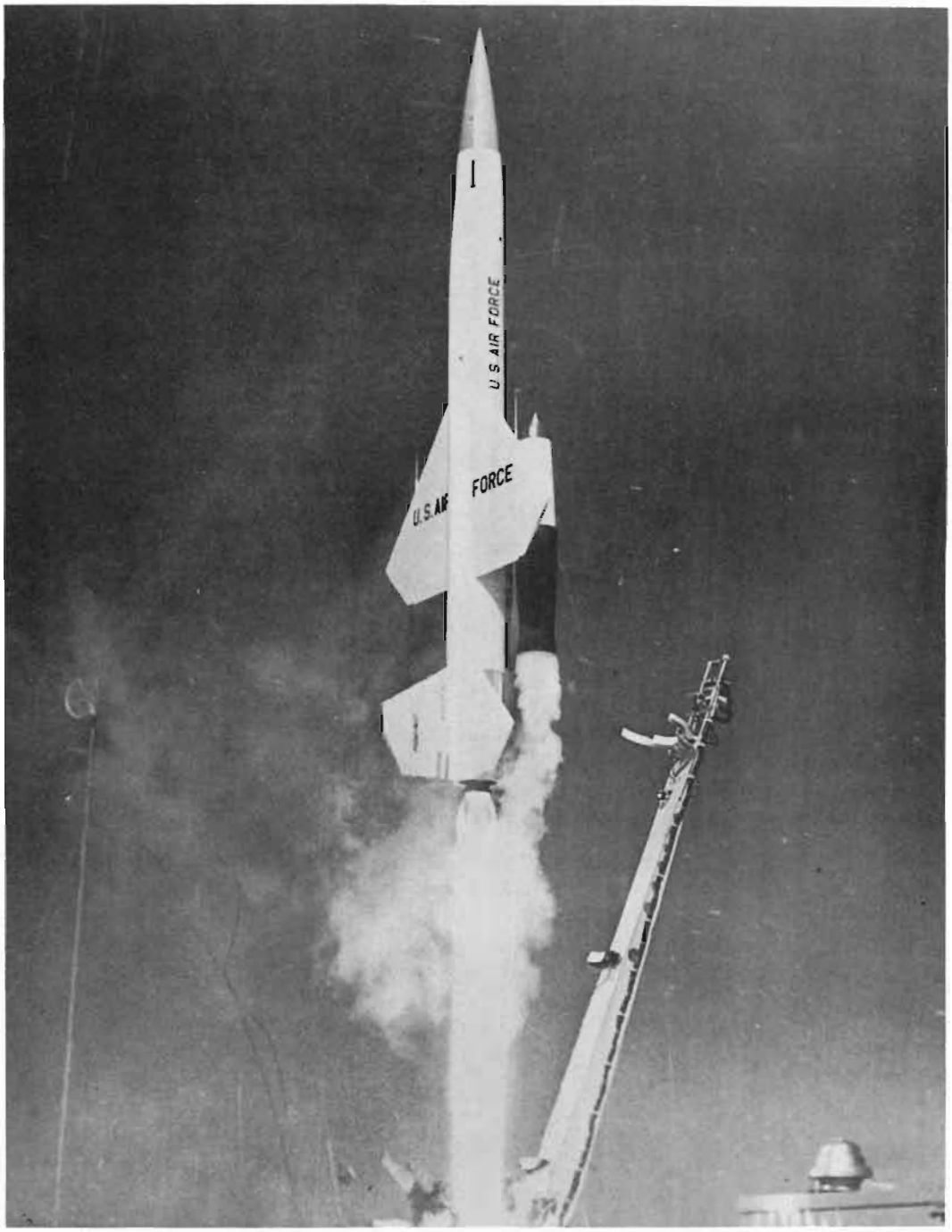
U (S) Hercules and Bomarc missile programs were completed during the first years of the 1960's. By November 1961, all Regular Army missile units were converted from the high-explosive-armed Nike Ajax to the advanced, nuclear-capable Nike Hercules. At that time, there were 139 fire units (126 in the CONUS, nine in Alaska, and four at Thule). The Ajax missiles were given to the National Guard. Then, in 1962, a program was started to phase the Ajax missiles out of the Guard and replace them with 48 Hercules fire units from the RA units. Phase-out of the Ajax missiles was completed in May 1964.

U (S) As noted in Chapter II, the first two Bomarc squadrons, equipped with "A" missiles, were organized in 1959. Eight squadrons of Bomarc were programmed for the U.S. and two for Canada. The last of the eight U.S. squadrons was formed in December 1961. The previous June, the first of the advanced "B" Bomarc missiles became operational. The two Canadian squadrons had been formed by the end of 1962, equipped with B missiles. After the U.S.-Canadian nuclear agreement in August 1963, nuclear warheads were furnished and the two Canadian squadrons were declared operational on 16 January 1964.

U (S) The A-model Bomarc missiles were phased out of the U.S. squadrons in the first six months of 1964. Three squadrons that had both types continued operation with B missiles only. Two squadrons that had only A missiles were discontinued, leaving six squadrons in the U.S.

USAF F-106's

RCAF CF-101B's



USAF ADC BOMARC MISSILE

COMMAND AND CONTROL

U(S) SAGE. By the end of 1961, the semi-automatic ground environment (SAGE) system, which began to come into operation in 1958, was operating at 21 sector direction centers and three region combat centers, all in the CONUS. Two more region combat centers gained SAGE capability in 1962 by being tied to nearby SAGE direction centers. The combined, hardened Northern NORAD Region combat center and Ottawa Sector Direction Center at North Bay, Ontario, became operational with SAGE on 1 October 1963, completing the NORAD SAGE system. Six SAGE sectors in the U.S. were phased out in 1963 at the direction of the Department of Defense and by the end of 1964, more cuts were directed.

U(S) BUIC. Alternate or back-up methods of operation for use if the primary SAGE centers were put out of commission had long been part of air defense plans. But the advent of the ICBM made the need for such even greater and increased the need to provide as much survivability as possible to other elements of the system. Extensive efforts in this direction were started in June 1961 following studies made by USAF and DOD. These studies indicated that a fairly small missile attack on SAGE and other vital elements of the current system could destroy NORAD's ability to carry out its mission. The Secretary of Defense approved a concept of back-up control and improvement in the ability of interceptors to survive by dispersal and other means. He directed that SAGE improvement and expansion be stopped and the money saved and other funding be used to provide a survivable back-up control system.

U(S) From this, came the establishment of a program for a SAGE backup system termed BUIC (Backup Intercept Control), implemented in phases. The first phase, essentially completed by the end of 1962, provided manual control using NCC's, NGCI's, and surveillance stations. This was followed by a second phase, BUIC II, which was to provide

semi-automatic control at NORAD Control Centers. BUIC II NCC's were to have the AN/GSA-51 computer, the first of which was delivered to the first site in late September 1964. BUIC II, to be established at 14 NCC's, was an interim system, giving way to BUIC III to be established at 19 NCC's in the FY 1968-1969 period. The final control system would have 12 SAGE direction centers backed up by the 19 BUIC III's. The BUIC III system would use the BUIC II computer with a number of improvements.

U(S) ARADCOM Control Equipment. By mid-1963, ARADCOM had ten Missile Masters (AN/FSG-1) and 18 BIRDIE systems (AN/GSG-5 or 6) in its system. To meet DA-directed cuts to provide manpower spaces, two MM's were phased out in September 1963 and replaced with BIRDIE's from other defenses. In late 1964, two more MM's were deleted by combining defenses.

U(S) In December 1963, DOD had approved the procurement of a new control system for ARADCOM, the AN/TSQ-51. NORAD proposed in its Objectives Plan issued in 1964 that these be used to replace the six remaining MM's and four of the BIRDIE systems.

NEW NORAD COMBAT OPERATIONS CENTER

U(S) As stated in Chapter II, in November 1959, USAF deferred all action on the new, hardened COC to be built in Cheyenne Mountain, south of Colorado Springs. This deferral lasted about a year. Excavation finally began on 19 June 1961 and was essentially completed by the end of 1962. In March 1963, work on the eleven internal buildings began. Construction was completed by late spring 1965. Equipment installation was to follow. Initial operational capability in the new COC was scheduled for 1 January 1966 and full operational capability for 30 June 1966. The target date for transfer of operations from the current COC to the new one was 1 April 1966. The old COC was to be closed no later than 1 July 1966.

BMEWS SITE I, THULE, GREENLAND

BAKER-NUNN CAMERA, PRIMROSE LAKE, ALBERTA

MISSILE AND SPACE DEFENSE

BALLISTIC MISSILE EARLY WARNING SYSTEM

U (S) 30 September 1960 was a landmark -- the first operation of a defense system against the ballistic missile threat. On this date, the detection radars at the first BMEWS site, Site I, Thule, Greenland, attained an initial operational capability.* Two-site detection capability was achieved on 30 June 1961 when Site II, Clear, Alaska, reached IOC with its detection radars. A tracking radar became operational at Site I at the end of 1961. A tracker was scheduled for Site II to become operational about mid-1966. The third site of the three-site BMEWS, built at Fylingdales Moor, England, gained limited operation in September 1963 and became fully operational on 15 January 1964. NORAD and RAF Fighter Command had joint operational control. Site III had tracking radars only.

SPACE DETECTION AND TRACKING SYSTEM

U (S) 1960 also saw NORAD's responsibilities expanded into space. On 7 November 1960, the JCS assigned CINCNORAD operational control and CINCONAD operational command of the Space Detection and Tracking System (SPADATS). This system consisted of the Air Force Spacetrack and the Navy SPASUR (Space Surveillance) systems. In April 1961, the JCS told NORAD that SPADATS was not to be restricted to the two original systems, but that other sensors and systems could be planned for.

U (S) The JCS also directed that the SPADATS control facility be manned and operated as an integral part of the NORAD COC. Until the Ent AFB

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* (S) Fully automatic operation was achieved at Site I on 31 January 1961 and at Site II on 30 September 1961.

COC achieved a computer capability, NORAD used the USAF facility at L. G. Hanscom Field, Massachusetts, for SPADATS control. This function was transferred to Ent AFB in June 1961. A clarification and strengthening of NORAD control over space defense was made in 1964 when the Secretary of Defense approved the NORAD concept and functions for a new Space Defense Center. The Space Defense Center was to be established initially in the current COC and then transferred to the new COC with a target date for attaining operational capability equal to that in the current COC of 1 April 1966.

ANTI-SATELLITE SYSTEMS

(U) Two anti-satellite systems had come into operation under CONAD operational control. An Army system using the Nike Zeus became operational in August 1963 and an Air Force system using the Thor became operational in May 1964. Both systems had demonstrated successful satellite intercept capabilities.

OTHER WARNING SYSTEMS

BOMB ALARM SYSTEM

(S) On 1 September 1962, a Bomb Alarm System (BAS) became operational and was placed under NORAD operational control. This system was established by Western Union for the USAF. BAS sensors were located at 97 CONUS sites and at Clear and Thule. The BAS would automatically indicate the time and location of nuclear detonations near instrumented locations and signal the information to NORAD Headquarters and other agencies.

CHEMICAL AND BIOLOGICAL WARFARE WARNING SYSTEM

(S) An interim, manual C/B system, consisting of approximately 450 CONUS military installations

with reporting responsibilities, became operational on 1 July 1964. This system was based on observations and judgment of trained personnel using available detection equipment and reporting observations to NORAD Headquarters. Establishment of this system was the responsibility of the Army which was also developing an automatic system.

APPENDIX

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ROSTER OF COMMANDERS

AAF/USAF AIR DEFENSE COMMAND

Lt Gen George E. Stratemeyer ..	Mar 46-Dec 48
Maj Gen Gordon P. Saville	Dec 48-Sep 49

CONTINENTAL AIR COMMAND

Lt Gen George E. Stratemeyer ..	Dec 48-Apr 49
Lt Gen Ennis C. Whitehead	Apr 49-Dec 50

USAF AIR DEFENSE COMMAND

Lt Gen Ennis C. Whitehead	Jan 51-Aug 51
Gen Benjamin W. Chidlaw	Aug 51-May 55
Maj Gen Frederic H. Smith, Jr.	May 55-Jul 55
Gen Earle E. Partridge	Jul 55-Sep 56
Lt Gen Joseph H. Atkinson	Sep 56-Feb 61
Lt Gen Robert M. Lee	Mar 61-Jul 63
Lt Gen Robert H. Terrill	Jul 63-Aug 63
Lt Gen Herbert B. Thatcher	Aug 63-

ALASKAN AIR COMMAND

Brig Gen Edmund C. Lynch	Dec 45-Oct 46
Brig Gen Joseph H. Atkinson ...	Oct 46-Feb 49
Brig Gen Frank A. Armstrong ...	Feb 49-Dec 50
Maj Gen William D. Old	Dec 50-Oct 52
Brig Gen W. R. Agee	Oct 52-Feb 53
Maj Gen George R. Acheson	Feb 53-Feb 56
Lt Gen Joseph H. Atkinson	Feb 56-Jul 56
Maj Gen Frank A. Armstrong	Jul 56-Oct 56
Maj Gen James H. Davies	Oct 56-Jun 57
Maj Gen Frank A. Armstrong	Jun 57-Aug 57

ALASKAN AIR COMMAND

Brig Gen Kenneth H. Gibson	Aug 57-	Aug 58
Maj Gen C. F. Necrason	Aug 58-	Jul 61
Maj Gen Wendell W. Bowman	Jul 61-	Aug 63
Maj Gen James C. Jensen	Aug 63-	

ALASKAN COMMAND

Maj Gen Howard A. Craig	Jan 47-	Aug 47
Lt Gen Nathan F. Twining	47-	50
Lt Gen William E. Kepner	50-	53
Lt Gen Joseph H. Atkinson	53-	Jul 56
Lt Gen Frank A. Armstrong	Jul 56-	Jul 61
Lt Gen George W. Mundy	Jul 61-	Jul 63
Lt Gen Raymond J. Reeves	Aug 63-	

RCAF AIR DEFENCE GROUP

G/C W. R. MacBrien	Dec 48-	May 51

RCAF AIR DEFENCE COMMAND

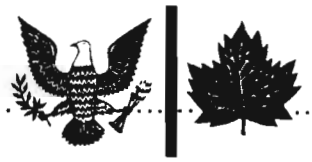
A/V/M C. R. Dunlap	Jun 51-	Jul 51
A/V/M A. L. James	Aug 51-	Sep 54
A/C C. L. Annis	Sep 54-	Jan 55
A/V/M L. E. Wray	Jan 55-	Aug 58
A/V/M W. R. MacBrien	Aug 58-	Sep 62
A/V/M M. M. Hendrick	Sep 62-	Aug 64
A/V/M M. D. Lister	Aug 64-	

ARMY ANTIAIRCRAFT COMMAND/ARMY AIR DEFENSE COMMAND

Maj Gen Willard W. Irvine	Jul 50-	May 52
Lt Gen John T. Lewis	May 52-	Sep 54
Lt Gen Stanley R. Mickelsen ...	Oct 54-	Oct 57
Lt Gen Charles E. Hart	Nov 57-	Jul 60
Lt Gen Robert J. Wood	Aug 60-	May 62
Lt Gen William W. Dick, Jr. ..	May 62-	Aug 63
Lt Gen Charles B. Duff	Sep 63-	

NORTHEAST COMMAND AND NORTHEAST AIR COMMAND

Maj Gen Lyman P. Whitten	Oct 50-	Mar 52



NORTHEAST COMMAND AND NORTHEAST AIR COMMAND

Maj Gen Charles T. Myers	Mar 52-Jul 54
Lt Gen Glenn O. Barcus	Jul 54-Sep 56

NORTHEAST AIR COMMAND

Lt Gen Glenn O. Barcus	Sep 56-Apr 57

NAVAL FORCES CONTINENTAL AIR DEFENSE COMMAND

Radm Albert K. Morehouse	Sep 54-Dec 55
Capt Dennis J. Sullivan	Dec 55-Apr 56
Radm Hugh H. Goodwin	Apr 56-May 57
Capt John G. Howell	May 57-Jul 57
Capt George L. Kohr	Jul 57-Sep 57
Radm Walter F. Rodee	Sep 57-Apr 60
Radm Thomas A. Ahroon	Apr 60-Jun 63
Radm James H. Mini	Jun 63-Dec 63
Capt Virgil A. Irwin	Dec 63-Aug 64
Capt Hoyt D. Mann	Sep 64-

CONTINENTAL AIR DEFENSE COMMAND

Gen Benjamin W. Chidlaw	Sep 54-May 55
Lt Gen Stanley R. Mickelsen ...	May 55-Jul 55
Gen Earle E. Partridge	Jul 55-Jul 59
Gen Laurence S. Kuter	Aug 59-Aug 62
Gen John K. Gerhart	Aug 62-Apr 65
Gen Dean C. Strother	Apr 65-

NORTH AMERICAN AIR DEFENSE COMMAND

Gen Earle E. Partridge	Sep 57-Jul 59
Gen Laurence S. Kuter	Aug 59-Aug 62
Gen John K. Gerhart	Aug 62-Apr 65
Gen Dean C. Strother	Apr 65-

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