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NORTH AMERICAN AIR DEFENSE COMMAND and CONTINENTAL AIR DEFENSE COMMAND

pp 47-48 were not declas.

HISTORICAL SUMMARY

JULY-DECEMBER 1962

1 APRIL 1963

Directorate of Command History
Office of Information
Headquarters NORAD/CONAD

[redacted] [redacted]

[redacted]

[redacted]

FROM: N/J3 Security Manager 24 Sep 93

SUBJ: Public Information Request (Mr Robert Gates)

TO: PAX (Attn: S.W. Johnson)

1. A review for public release of several classified NORAD historical papers was conducted per your 25 Aug 93 ltr. The following historical papers were reviewed:

a. Air Defense of Alaska, 1940-1957, Hist Ref Paper #2 (S)
b. Fifteen Years of Air Defense, 1946-1961, Hist Ref Paper #3 (C)
c. NORAD's Quest for Nike Zeus and Long Range Interceptor, Hist Ref Paper #6 (S)
d. Seventeen Years of Air Defense, 1946-63, Hist Ref Paper 9 (S)
e. NORAD's Underground Combat Operations Center, 1956-66, Hist Ref Paper 12 (S)
f. 1962 NORAD History (2 parts), Jan-Jun 1962; Jul-Dec 1962 (S)

2. All of these historical papers are over 30 years old, marked classified, and are either without paragraph markings or downgrading instructions. AFR 205-1 states that cognizant authority within the Command has declassification authority. Dr Tom Fuller, NORAD Historian (HO), and Mr Mark Carlson, Freedom of Information Act Officer (N/SPJ2CM) are deemed as cognizant authority and assisted in the declassification process.

3. Dr Fuller's and Mr Carlson's findings are that all the documents, in their judgment, can be declassified with the following recommendations/comments:

<u>Historical Reference Paper #2</u>: (Carlson) Is unclassified.

<u>Historical Reference Paper #5</u>: (Carlson) Is unclassified.

<u>Historical Reference Paper #6</u>: (Carlson) Is unclassified but recommend USSPACECOM/J3 review the ASAT statements on page 20.

<u>Historical Reference Paper #9</u>: (Carlson) Is unclassified.

<u>Historical Reference Paper #12</u>: (Fuller) Most of the document talks about the old ENT Bldg and can be declassified. However, there are some descriptions concerning Cheyenne Mtn that should remain sensitive/classified. N/J3 Security Manager concurs. Recommend the document be declassified with the exception of those

pages (see document) that should be sanitized prior to public release.

<u>1962 NORAD History (2 parts), Jan-Jun 1962; Jul-Dec 1962</u>: (Carlson) The document can be unclassified with the following exceptions: cannot determine declassification for page 35, NSA System (Part 1), and for pages 47-48, NUDET/Bomb Alarm (Part II). Sanitize these pages prior to public release.

4. Our recommendation is to approve for public release those historical reference papers, except those recommendations/comments already mentioned, identified in para 1. HQ NORAD POC is Capt Bruder, J3OS, 4-3988.

ROBERT M. BRUDER, Capt, USAF
HQ NORAD J3 Security Manager

1st Ind, NORAD HO

Concur. NOTE: HO recommends PA verify above procedures are correct before final release of historical papers. Also, HO does not have declassification authority.

DR THOMAS FULLER
HQ NORAD Historian

2nd Ind, N/SPJ2CM

Concur.

MARK A. CARLSON
Freedom of Information Act (FOIA) Officer

FOREWORD

This historical summary is one of a series of semiannual reports on the North American Air Defense Command and the Continental Air Defense Command. These summaries bring together in a single document the background and progress of key activities of NORAD/CONAD. The purpose of these reports is two-fold:

> First, they provide commanders and staffs a continuing reference and orientation guide to NORAD/CONAD activities.
>
> Secondly, they preserve for all time the record of NORAD/CONAD activities.

1 April 1963

JOHN K. GERHART
General, USAF
Commander-in-Chief

CONTENTS

[redacted]

MAPS AND CHARTS

[redacted]

[redacted]

SUMMARY OF THE FORCES

(AS OF 1 JANUARY 1963)

MISSILE FORCE

Regular

2 BOMARC A Squadrons
5 BOMARC B Squadrons
3 BOMARC A & B Squadrons
Missiles Authorized - 209 A, 252 B
Missiles Assigned - 208 A, 252 B

135 Hercules Fire Units
Missiles Authorized - 1742

Army National Guard

4 Hercules Fire Units
Missiles Authorized - 60
48 Ajax Fire Units
Missiles Authorized - 960

INTERCEPTOR FORCE

Regular

49 Fighter Interceptor Squadrons - 960 aircraft authorized, 978 aircraft assigned

Squadrons:	17	11	14	1	1	5
	F-101	F-102	F-106	F6A	F4B	CF-101

[redacted]

[redacted]

Augmentation

U.S. Navy/Marines - F4B, F3B, F8A, F8D, F6A, F11A, and F9J aircraft as available.
TAC Regular Force - 56 aircraft as available (D-Day through D+30).
TAC Regular Force - 42 aircraft as available (D-Day through D+5).
USAF ADC - 144 aircraft.
RCAF ADC - CF-100 and CF-101 aircraft as available.

SURVEILLANCE AND CONTROL

Surveillance

193 Prime Radar Sites
105 Gap Filler Radars
Distant Early Warning Line:
- Land Based Segment - 6 main, 28 intermediate, and 23 auxiliary stations
- Aleutian Segment - 1 main and 5 auxiliary stations
- Greenland Segment - 4 auxiliary stations

Mid-Canada Line: 8 Section Control and 90 Doppler Detection Stations
Picket Ships - 11 Stations authorized, 10 manned
AEW&C Stations - Key West station manned full time, other 10 stations manned 30% of time on random, rotating basis
Pacific Barrier (under operational control of CINCPAC) - 5 aircraft stations
G-I-UK Barrier (under operational control of CINCLANT) - 2 aircraft stations, 1 DER station, and 2 Iceland-based radars
2 Ballistic Missile Early Warning Stations
1 Space Detection and Tracking System
1 Bomb Alarm System - 99 instrumented areas, 12 display facilities, and 6 master control centers

[redacted]

Control

1 Combat Operations Center
2 NORAD ALCOP's
8 NORAD Region Combat Centers - 5 SAGE (2 remoted from Sector DC) and 3 manual
23 Sector Direction Centers (21 SAGE, 2 manual)
3 NORAD Sectors without direction centers
34 NORAD Control Centers
1 CONAD Control Center (Thule AB, Greenland)

MANPOWER

Authorized

NORAD and Components	- 175,677
National Guard and Reserve	- 42,789
TOTAL	- 218,466

CHAPTER 1

THE CUBAN CRISIS

INTRODUCTION

The discovery of offensive weapons in Cuba resulted in the announcement by the President on 22 October that the U.S. intended to blockade the island. The objective was to prevent entry into Cuba of offensive weapons and ultimately to bring about the withdrawal of such weapons. Accordingly, a sea quarantine was established, effective 1400Z, 24 October. CONAD took various measures in order to be prepared for the possibility of offensive reactions on the part of Cuba and Russia.

ALERT AND DISPERSAL

SYSTEM-WIDE

At 1745Z, 22 October 1962, CONAD raised its weapons readiness status from Alpha, DEFCON 5, the normal peacetime condition, to Delta, DEFCON 5. DEFCON 3 was declared for CONAD at 2300Z on the 22d. CONAD, except for the Montgomery Sector, remained on increased alert for 36 days, six hours and ten minutes (until 2355Z, 27 November) - the longest period of increased preparedness in the history of postwar air defense. Modified Charlie status was declared for all regions, except the 32d, at 2100Z on the 22d and Normal Charlie the next day at 2135Z.

On 24 October, Canada declared DEFCON 3. Following this declaration, at 1723Z, NORAD declared

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* A Top Secret CONAD study of NORAD/CONAD participation in the Cuban crisis is available to authorized individuals.

DEFCON 3. NORAD/CONAD weapon status (except for the 32d Region) was lowered to Bravo on 3 November, which was held until 27 November.

In the meantime, at 1900Z on 22 October, CONAD ordered all CONUS regions to disperse aircraft to the interim dispersal bases listed in ADC's Operations Plan 20-62, Annex O. Aircraft were directed to disperse with primary weapons. The Alaskan CONAD Region also dispersed aircraft to its alert bases. Dispersal was not made to Canadian bases because of a restriction on over-flying Canada with nuclear weapons until delcaration of DEFCON 1 or higher.

Dispersal in the continental U.S. was completed by 0040Z, 23 October, five hours and 40 minutes after it was ordered. Approximately 155 aircraft were dispersed (including those in Alaska but not including aircraft moved to Florida) to 20 bases.

A few days later, in response to a CONAD request, the JCS authorized a reduced and random dispersal consistent with a combat-ready posture and with inspection and maintenance requirements. Following receipt of the recommendations of the regions, authorization was given to return some 20 aircraft to home bases. These returned, for the most part, during the first two weeks of November. Although dispersal problems were few at this time, the regions anticipated difficulties when very cold weather set in. Dispersal bases lacked heated facilities and other requirements to handle nuclear weapons.

MONTGOMERY SECTOR

The forces in the Montgomery Sector, being directly and immediately involved in protecting against the Cuban threat, maintained the highest alert posture and stayed on alert longer (from 22 October to 3 December - 42 days) than forces in

other areas. Except for the first day of this period, the alert posture for the Florida area was graduated up or down according to the time of day. The highest alert was established for the dawn period; it was slackened somewhat during the day and night periods. As required, units were moved from Charlie to Delta status and aircraft were placed on "sling-shot" (engines running) in the early stages of the crisis or "battle stations" (crews in aircraft near runway ready to be airborne in a minimum time but less than five minutes). An air patrol was maintained all during the crisis period over strategic points.

AUGMENTATION OF THE FLORIDA FORCES

Because of the Cuban Crisis, CONAD augmented its forces in the Florida area. Prior to this build-up, CONAD had 24 fighter-interceptor aircraft in southern Florida, consisting of 12 F4B's of VF-41 at Key West NAS, 8 F6A's of VF(AW)-3 at Key West NAS, and 4 F-102's of the 482d FIS at Homestead AFB. There was one picket ship and one AEW&C station being manned off the coast. There were prime land-based radars at Key West NAS and Richmond AFS and gap fillers at Naples, Long Key, and Jupiter.

By the 22d of October, there were nearly 150 interceptors under CONAD control in the Florida area. This remained the approximate number throughout the crisis period. Aircraft were moved in from Seymour-Johnson AFB, Langley AFB, Selfridge AFB and Webb AFB and placed at Homestead AFB and Patrick AFB. Later, aircraft were also placed at McCoy AFB and MacDill AFB. The total included approximately 60 aircraft that were already at Tyndall AFB, under the 73d Air Division, which were placed on alert.

Three AEW stations were being manned by the 24th and additional picket ships were providing radar coverage as a secondary mission. To man the two additional AEW stations, six RC-121's were

added to McCoy AFB and six WF-2's to Key West NAS.

CONAD forces were further strengthened between 24 October and 2 November, when deployments were completed, by the addition of three Hercules batteries, eight Hawk batteries, and one 40mm battery. Four of the Hawk batteries were placed at Key West, two at Homestead, one at Patrick, and one at MacDill. The three Hercules batteries and one 40mm battery were placed at Homestead.

In the meantime, the Air Force put into operation an improvised Cuban missile early warning system. This system, which was given the project name of "Falling Leaves" by the 9th Aerospace Defense Division, consisted of three radars. These were: (1) an AN/FPS-49 at Moorestown, New Jersey, which was reoriented south and operated for missile coverage of Cuba on 24 October; (2) an AN/FPS-78 at Laredo, Texas, which began missile detection operation on 26 October; and (3) an AN/FPS-35 at Thomasville, Alabama, which began missile detection operation on 30 October.

CRISIS TERMINATION

By 10 November, aerial surveillance and checks at sea had established that Soviet ships had removed 42 offensive missiles from Cuba. Later, Russia gave assurance that the IL-28 bombers would be removed also. The U.S., therefore, lifted its quarantine on 21 November. By the 7th of December, 42 IL-28's had been shipped out of Cuba.

In air defense, the major actions in returning to a more normal condition were these: (1) 17 November, dispersed aircraft authorized to return to home stations; (2) 27 November, NORAD and CONAD, except the Montgomery Sector, resumed DEFCON 5, Alpha; and (3) 3 December, Montgomery Sector resumed DEFCON 5, Alpha, and most of the aircraft, which had augmented the Florida force, released from Florida.*

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* For impact of the crisis on training, see page 85.

Dispersal was cancelled on 17 November, following JCS approval, but bad weather held up return of the dispersed aircraft in many cases. By 22 November, most aircraft had been returned to home bases.

With the exception of the Montgomery Sector, NORAD and CONAD reverted from DEFCON 3 Bravo to DEFCON 5 Alpha, in keeping with JCS guidance, at 2355Z on 27 November. The Montgomery Sector remained on DEFCON 3 Charlie.

In the meantime, the flying rate was reduced in the Florida area. The Air Force F-102's and F-106's and Navy F4B's had been flying some three to four times the programmed rate, greatly straining supply and maintenance capability. CINCLANT asked that the rate be cut to about 27 hours per month per aircraft to permit adequate materiel support. ADC had indicated that 35 hours could be supported for its aircraft. Accordingly, NORAD directed the 32d Region to establish an optimum daily activity rate that could be sustained for an indefinite period, staying within a 27/35 hour rate for normal conditions. The region was to also provide a capability to increase the defensive posture as required.

The region, therefore, put into effect a plan, approved by NORAD, on 20 November for sustained operations. It contained five options for operations under all conditions. The plan selected was to be based on the threat and the region commander's estimate of the situation and during normal conditions was to be within the capability of the forces to sustain for an indefinite period.

In actions taken on 3 December, and in some instances earlier, as much as possible of the temporary force was released pending determination of what the permanent southeast force was to be. For example, on 28 November, the Moorestown and Laredo radars were returned to their primary SPADATS mission. At 2200Z on 3 December, CONAD established

DEFCON 5 Alpha for the Montgomery Sector and released most of the aircraft that had been moved into Florida including the WF-2's and extra RC-121's. Twenty F-102's were kept at Homestead plus the 8 F6A's of VF(AW)-3 and 14 F4B's of VF-41 at Key West. Also remaining were the three Hercules batteries and eight Hawk batteries. NORAD asked that the 40mm battery be returned.

A message commending the NORAD forces was sent by the Commander-in-Chief on 3 December:

> ...although the Cuban crisis is not a closed issue, I wish to pass to all concerned my congratulations on the efficient and thoroughly professional manner in which NORAD forces reacted to the crisis. That this was well done testifies to the leadership, energy and initiative displayed at all levels, particularly in view of the special nature of the Cuban situation.

What the permanent force in the southeast was to be awaited JCS and DOD approval. In the meantime, many changes were planned for the interceptor force. On 1 February 1963, the VF(AW)-3 detachment was to be released and VF-41 was to be replaced by a Marine squadron of 12 F4B's. On 15 February, the F-102's at Homestead were to be cut to a strength of six aircraft to make room for the equipping of an ADC squadron with F-104's. This squadron, the 319th, was to be placed there without aircraft or crews in March; it was to have six planes by mid-April and to be fully equipped and operational by mid-June.

CHAPTER 2

ORGANIZATION

MANPOWER CHANGES

NORAD HEADQUARTERS REORGANIZATION

The results of NORAD's first complete review of its headquarters' organization and functions since March 1959, started in early 1962, were presented to CINCNORAD on 10 September 1962. As ultimately approved by CINCNORAD, the reorganization:

1. Shifted 24 spaces within the headquarters. Included in this shift were 7 Colonel or equivalent spaces transferred to the COC* and 5 more officers for the 425L Phase C (test bed) underground NORAD COC program.

2. Saved 13 manpower spaces, including two general officer spaces.

3. Reduced from rear admiral to captain (USN) one of the Assistant DCS/Operations slots, and retitled it. The DCS/Operations had had two assistants, both general officers and both of equal rank (one Army brigadier general and one Navy rear admiral). It was felt that this was both a source of confusion and a waste of general officers. By downgrading the rear admiral slot to captain (USN) and retitling it Assistant to DCS/Operations (instead of Assistant DCS/Operations, thus removing it from the chain of command), the headquarters hoped to remove both these deficiencies.

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* See NORAD Historical Summary, Jan-Jun 1962, p. 15.

4. Dropped the request for five officers to provide NORAD representation in the NORAD/ADC Communications Center. It was felt that NORAD representation here would serve no purpose. It was ADC's job to provide the service and if it wasn't satisfactory corrective steps could be taken at the command level.

Some of the changes required the approval of the JCS, but this proved no obstacle. The JCS approved the changes in their entirety in November and the changes were incorporated into a revised NORAD JTD that went into effect on 1 January 1963.

NORAD HEADQUARTERS MANNING

NORAD Headquarters as of 31 December 1962 was authorized 721 spaces - 527 USAF (including civilians), 109 USA, 44 USN, 39 RCAF, and 2 USMC. The new 1 January 1963 JTD reduced this total by 13 spaces, to 708 - 518 USAF, 106 USA, 43 USN, 39 RCAF, and 2 USMC.

JCS CONCERN OVER MANPOWER REQUIREMENTS

NORAD's headquarters review was timely. In September 1962, the JCS again expressed concern over the increased manpower requirements for unified/integrated command headquarters and with the growing percentage of higher grades involved. During the period 1 July 1960 to 1 January 1962, the JCS pointed out, the number of spaces allotted to unified/integrated command headquarters increased from 17,400 to 27,300. Furthermore, there was an uneven distribution of general and flag officers, by service, within these headquarters. The proportion of total general/flag officers in these activities, by percentage authorized for each military service, varied from a low of 10% in one service to a high of 19.3% in another. In an attempt to halt the proliferation and even out the general/flag officer percentages among the services,

[redacted]

NORAD ORGANIZATION

1 JANUARY 1963

- CINC NORAD
  General J. K. Gerhart
  - 25th NORAD Region
    McChord AFB, Wash.
    MG Henry R. Spicer
    - Seattle NORAD Sector
      McChord AFB, Wash.
      BG Grover C. Brown
    - Portland NORAD Sector
      Adair AFS, Corvallis, Oregon
      Col Leon W. Gray
    - Spokane NORAD Sector
      Larson AFB. Wash.
      Col Robert J. Ahern
  - 26th NORAD Region
    Hancock Field, N.Y.
    MG Henry Viccellio
    - Boston NORAD Sector
      Stewart AFB, N.Y.
      BG William D. Greenfield
    - New York NORAD Sector
      McGuire AFB, N.J.
      BG Arthur G. Salisbury
    - Syracuse NORAD Sector
      Hancock Field, N.Y.
      Col Edward A. Herbes
    - Washington NORAD Sector
      Fort Lee, Va.
      BG James B. Tipton
  - 28th NORAD Region
    Hamilton AFB, Calif.
    MG Mervin M. Magee
    - Los Angeles NORAD Sector
      Norton AFB, Calif.
      BG Henry C. Newcomer
    - San Francisco NORAD Sector
      Beale AFB, Calif.
      BG Carroll W. McColpin
    - Reno NORAD Sector
      Stead AFB, Nevada
      Col Hubert Zemke
    - Phoenix NORAD Sector
      Luke AFB, Arizona
      Col William R. Nevitt
  - 29th NORAD Region
    Richards-Gebaur AFB, Mo.
    MG Dolf E. Muehleisen
    - Grand Forks NORAD Sector
      Grand Forks AFB, N.D.
      Col Archie M. Burke
    - Great Falls NORAD Sector
      Malmstrom AFB, Mont.
      Col Jean H. Dougherty
    - Minot NORAD Sector
      Minot AFB, N.D.
      Col Thomas L. Hayes, Jr.
    - Sioux City NORAD Sector
      Sioux City Mun Apt, Iowa
      Col Wayne E. Rhynard
    - Denver NORAD Sector
  - 30th NORAD Region
    Truax Field, Wisc.
    MG Fredrick R. Terrell
    - Detroit NORAD Sector
      Custer AFS, Battle Creek, Mich
      Col Glendon P. Overing
    - Chicago NORAD Sector
      Truax Field, Wisc.
      BG Kenneth H. Gibson
    - Duluth NORAD Sector
      Duluth Mun Arpt, Duluth, Minn
      Col Harrison R. Thyng
    - Sault Ste Marie NORAD Sector
      K. I. Sawyer AFB, Mich.
      Col Richard W. Davenio
  - 32nd NORAD Region
    Oklahoma City AFS, Okla.
    MG Thomas J. Gent, Jr.
    - Montgomery NORAD Sector
      Gunter AFB, Alabama
      BG Hubert S. Judy
    - Oklahoma City NORAD Sector
  - Northern NORAD Region
    RCAF Station St Hubert
    St Hubert, P Q, Canada
    A/V/M J. B. Harvey
    - Bangor NORAD Sector
      Topsham AFS, Brunswick, Me
      A/C F. R. Sharp
    - Ottawa NORAD Sector
      Edgar, Ont., Canada
      G/C W. A. Hockney
    - Goose NORAD Sector
      Melville AS, Lbdr
      Col V. Milner, Jr.
    - Hudson Bay NORAD Sector
  - Alaskan NORAD Region
    Elmendorf AFB, Alaska
    LG George W. Mundy

[redacted]

the Secretary of Defense ordered unified/integrated commands to establish a system for programming manpower requirements five years ahead of the current fiscal year, institute more stringent controls over the management of manpower resources, and conduct manpower surveys of headquarters annually.

LIAISON OFFICERS AT SAC

Late in 1960, the JCS approved, and NORAD sent to Headquarters SAC, a team of six liaison officers -- one colonel, one lieutenant colonel, and four majors. This was the result of an agreement between SAC and NORAD on the need to exchange liaison teams.

This large team was needed at SAC primarily because the BMEWS system was being phased-in and SAC needed on-the-spot technical advice from NORAD officers. Later, another lieutenant colonel was added to the team, making a total of seven.

By the latter part of 1962, however, SAC controllers had become sufficiently acquainted with BMEWS to eliminate the requirement for a NORAD liaison officer to be on duty in the SAC Command Post 24 hours a day. Consequently, NORAD and SAC agreed on a reduction of the number of NORAD team members from seven to two, retaining only the two lieutenant colonels. One of the officers, assigned to SAC's DCS/Operations Training Division, would continue to assist SAC on Safe Passage procedures, Joint Strategic Target Planning, SAC/NORAD exercises, and other SAC/NORAD matters. The other, assigned to SAC's DCS/Operations Control Division, would continue to advise on BMEWS, on changes in the NORAD structure and NORAD procedures, and on changes in NORAD's weapons use practices that might affect the SAC force.

ARADCOM BUIC MANNING

ARADCOM, in July 1962, recommended that it provide one officer and two enlisted men at each of the following Mode III NCC's for the manual backup system: P-37, P-40, P-44, P-49, P-50, P-53, P-54, P-56, P-59, P-61, P-69, P-72, and C-5. ARADCOM proposed two officers and four enlisted men at TM-198, and four officers and eight enlisted men at P-75, P-52, and M-125. Since ADA facilities varied in size, NORAD asked each NORAD region commander to figure out site by site the number of ARADCOM personnel needed for a Mode III operation.

Following their response, NORAD agreed with the ARADCOM proposal of one officer and two enlisted men at NCC's having only one AADCP within their area of responsibility (P-37, P-40, P-44, P-59, P-69, and C-5). NORAD also agreed to the proposed Mode III ARADCOM manning at P-75, M-125, and TM-198, and further agreed to the proposal for four officers and eight enlisted men at the collocated NCC to be located at Perrin AFB, Texas, in place of P-53 at Oklahoma City.

NORAD said, though, that NCC's having more than one BIRDIE/Missile Master AADCP within their areas would need more Army manning. For these (P-49, P-50, P-54, P-56, and P-72), NORAD recommended one officer and four enlisted men. For NCC's with three AADCP's (P-53 and P-61), NORAD recommended two officers and six enlisted men. These were NORAD's recommendations unless and until actual experience under the manual system demanded changes. ARADCOM agreed with the recommendations and requested the spaces needed from the Department of the Army.

PROPOSED REDUCTION OF WEAPONS CONTROLLERS

USAF ADC on 22 June 1962 asked for NORAD's approval to reduce military manning at the POW and BAR DEW Line data centers (in the ANR area) by a

total of 10 weapons controllers, and to delete the USAF weapons controllers at the PIN, CAM, FOX, and DYE data centers (in the NNR area). NORAD asked ANR and NNR for their opinions of the proposal.

ANR agreed only to reducing the grades of five of the ten spaces affected in their area from officer to airman spaces.

RCAF Headquarters, replying for NNR, opposed the deletion of the USAF weapons controllers at the four DEW Line sites in their area, stating that two controllers, one RCAF and one USAF, were still needed at each site. Suspecting that the USAF ADC proposal was prompted in part by a shortage of USAF manual controllers, however, the RCAF suggested that a substitute agreeable to them would be the replacement of the USAF operations officer (weapons controller) with an officer of any other trade who would be trained on site. This would mean that the RCAF would have to supply both weapons controllers instead of just one, however, and the RCAF was also suffering from a shortage of weapons controllers.

NORAD backed ANR's position, recommending that ADC consider deleting the air contracting officer at the two ANR data centers and giving their duties to the weapons controllers. For the four RCAF DEW Line sites in question, NORAD recommended that USAF ADC leave its weapons controllers at all four.

SECTORS

REASSIGNMENT OF BANGOR NORAD SECTOR TO NNR

By mid-1962, plans had shaped up to transfer the Bangor NORAD Sector from the 26th NORAD Region to NNR.* At the same time, the Fredericton and

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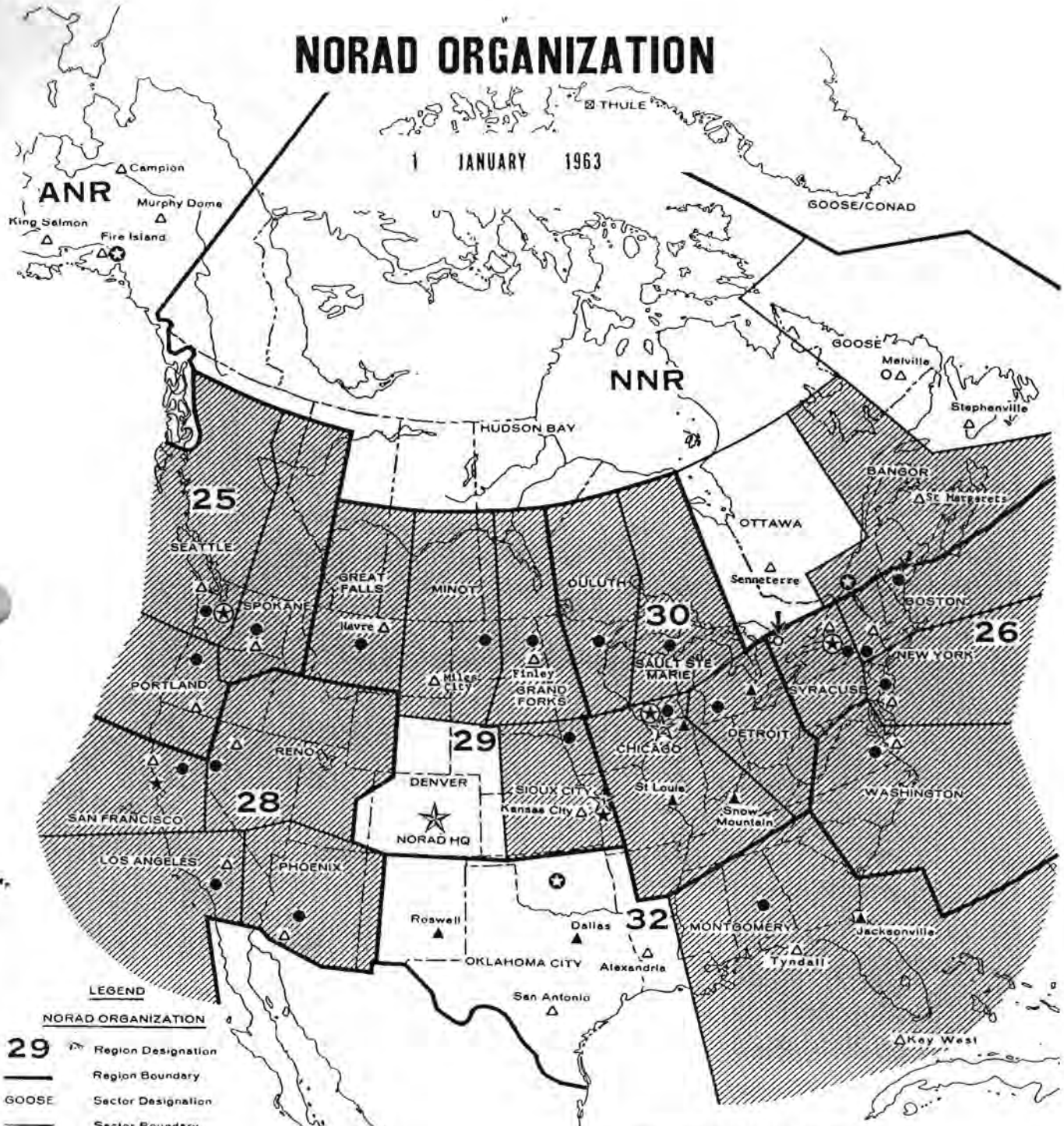
* See NORAD Historical Summary, Jan-Jun 62, pp. 8-11.

[redacted]

CONFIDENTIAL

NORAD ORGANIZATION

1 JANUARY 1963



LEGEND

NORAD ORGANIZATION

- 29 — Region Designation
- Region Boundary
- GOOSE — Sector Designation
- Sector Boundary
- Combat Operations Center (COC)
- Alternate Command Post (ALCOP)
- Region Headquarters and Region Combat Center-SAGE (RCC-S)
- Region Headquarters and Region Combat Center-SAGE remoted from Sector Direction Center-SAGE (RCC-DC-S)
- Region Headquarters and Region Combat Center-Manual (RCC-M)
- Sector Direction Center-SAGE (SDC-S)
- Sector Direction Center-Manual (SDC-M)
- Sector Direction Center Located Outside Boundary

NORAD CONTROL CENTER (NCC)

[Name shown if not same as Sector (eg Alexandria)]

- Manual NCC
- Interim NCC (to be discontinued under the BUIC Plan)
- CONAD Control Center (CCC)
- Sector whose Sector Direction Center is SAGE (SDC-S)

[redacted]

CONFIDENTIAL

Montreal Sectors were to be discontinued and the adjacent Ottawa and Montreal Sectors were to take over the Fredericton and Montreal areas of responsibility. Concurrently, Boston Sector was to take over part of Bangor Sector's area.

Exercises in the Montreal Sector pushed back the Bangor Sector transfer and the discontinuance of the Montreal and Fredericton Sectors from 1 August to 15 September. Nevertheless, it was decided to go ahead with Boston Sector's expansion into Bangor Sector's area on 1 August as planned, even though it would temporarily cut Bangor Sector's area in half. Accordingly, NORAD issued general orders enlarging Boston's area of responsibility and shrinking that of Bangor Sector effective 1 August 1962.

On 15 September 1962, the exercise in the Montreal Sector out of the way, the other changes took place:

1. Fredericton NORAD Sector was discontinued.

2. Montreal NORAD Sector was discontinued.

3. Bangor NORAD Sector was reassigned from the 26th NORAD Region to NNR.

4. NNR's boundaries were changed to include the Bangor Sector.

5. Bangor Sector's boundaries were changed to include a small piece of the Ottawa Sector, part of the former Montreal Sector, all of the former Fredericton Sector, part of the Goose Sector, and part of the Boston Sector.

6. Ottawa Sector's boundaries were changed to include most of the former Montreal Sector. Ottawa also gave up a small piece of its territory to Bangor Sector.

7. Goose Sector's boundaries were changed as it lost territory to the Bangor and Hudson Bay Sectors.*

8. Hudson Bay Sector's boundaries were changed to include part of Goose Sector's area.

9. The 26th NORAD Region's area of responsibility was changed to exclude Bangor NORAD Sector's former area.

10. Boston Sector's boundaries were changed to include a small piece of the former Fredericton Sector. At the same time it lost some of its oceanic area to Bangor Sector.

When Boston NORAD Sector took over about half of Bangor NORAD Sector's area of responsibility on 1 August 1962, Boston CONAD Sector expanded identically. When the additional boundary changes took place on 15 September, Boston CONAD Sector lost part of its oceanic area to Bangor CONAD Sector. The Bangor CONAD Sector's area shrank, then expanded, accordingly.

A problem arose as to what to do with the Bangor CONAD Sector when the Bangor NORAD Sector transferred from the 26th Region to NNR on 15 September. The Bangor CONAD Sector consisted of the U.S. territory and adjacent territorial and international waters in the Bangor NORAD Sector. It could not follow the Bangor NORAD Sector to NNR because of its strictly U.S. associations, so it was decided to assign the Bangor CONAD Sector directly to CONAD Headquarters. At the same time (15 September), the 26th CONAD Region's area was reduced to exclude the Bangor CONAD Sector.

This arrangement subsequently posed several problems, revolving primarily around communications

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* The loss to Hudson Bay Sector is explained in NORAD Historical Summary, Jan-Jun 1962, p. 9.

and nuclear armament. CONAD had to be able to communicate with the Bangor CONAD Sector to pass on instructions for nuclear weapons release. The existing organization and communications facilities dictated that CONAD contact the Bangor CONAD Sector either through NNR or the 26th CONAD Region, or set up a direct communications link between the sector and CONAD Headquarters. A direct link would have been too costly, however, and CONAD could not go through NNR because of the strictly unilateral nature of CONAD operations. Consequently, CONAD Headquarters had to go through 26th CONAD Region Headquarters to talk to the Bangor CONAD Sector. This meant unacceptable communications delays and the use of unusual operational procedures. On 1 December, therefore, CONAD reassigned the Bangor CONAD Sector to the 26th CONAD Region.

BANGOR NORAD SECTOR BOUNDARY

The 26th NORAD Region became concerned in September over complications caused by the irregular boundaries of the Bangor Sector. A dog leg in the Bangor Sector extended its area 40 miles west of the eastern boundary of the Syracuse Sector, directly north of the only active fighter interceptor squadron in the Syracuse Sector. This dog leg, by interposing itself between the Syracuse and Ottawa Sectors, disrupted a tactical agreement between those two sectors eliminating the need for handover actions between them. Furthermore, the dog leg increased the need for lateral retelling of tracks approaching from the north or northeast. Where before they had to be told only from the Ottawa Sector to the Syracuse Sector, now they had to be retold as many as three times within 130 miles. The 26th wanted to change the boundaries of the sectors in the area to avoid these difficulties.

NORAD turned the request down. NORAD pointed out that the boundaries were only temporary, pending the Ottawa Sector's becoming SAGE-operational.

Furthermore, radar site C-1 was to become operational in the near future, and this would enable the Bangor Sector to eliminate the need for much of the lateral retelling objected to by the 26th Region. For these reasons, NORAD thought it would not be worthwhile to go through the extensive readaption affecting six sectors that would have been required by the 26th Region's proposal.

In connection with Site C-1, mentioned above, NORAD, at the end of the year, was considering moving the temporary western extension of the Bangor Sector (the dog leg) northward to encompass Ottawa's C-1, C-7, and C-42 radar sites when C-1 became SAGE operational early in 1963. It was thought that this would increase Bangor's control over the LaMacaza BOMARC's, and would alleviate some of the problems of lateral telling between the Ottawa, Bangor, and Syracuse Sectors. The proposed change would last only until the Ottawa Sector became fully SAGE in the fall of 1963. But NNR opposed the change on the grounds that lack of communications in the area would hamper the safe, efficient handover of weapons and information, so the matter was dropped.

CHAPTER 3

MANNED BOMBER DETECTION SYSTEMS

GAP FILLERS

The program to expand and modernize the gap filler system in the U.S. and Canada continued to be dogged by reassessments, reductions, and contractor delays. The program that started out in 1960 requiring 194 gap fillers in both countries, all but 12 of which were to be new FPS-74 radars, had shrunk by mid-1962 to a total of 174 gap fillers. Only 124 of these were to be FPS-74's (79 in the U.S., 45 in Canada); the other 50 were to be FPS-18's, all in the U.S.

Then in July 1962, Canada announced its intention to defer the Canadian gap filler program until Canadian FY 1964-65 (April 1964-April 1965) because of financial stringencies and difficulties in the FPS-74 program. The program had already slipped six months because of the contractor's inability to meet the schedule, and AFSC's Electronic Systems Division (ESD) was predicting further delays.

Because of the Canadian deferment, and FPS-74 production delays, USAF asked ADC to set up a meeting of all commands and agencies concerned to ponder the gap filler program's problems. The group was to review the status of the FPS-74 production schedule and, if an acceptable FPS-74 could not be produced and installed within a reasonable length of time, re-evaluate low level coverage requirements. The group was also to study the effect that the Canadian deferment of its 45 FPS-74's until Canadian FY 1964-65 would have on the over-all FPS-74 gap filler program.

During the course of the meeting, held in Colorado Springs on 8 and 9 August 1962, NORAD learned that production had slipped another three months. The first production model FPS-74 was not to be installed now until May 1963. The USAF Project Engineer felt the contractor would be able to meet the new date, however.

It was also pointed out at the conference that if Canada held to its decision to defer the gap filler program to FY 1964-65, USAF would have to cancel the 45 Canadian gap fillers from the current contract. This would be necessary because of a U.S. Government policy regarding buying equipment too long before it was to be used. USAF would later try to get the money back, but feared that the possibilities of its being able to do so would be remote.

Since a deferment to FY 1963-64 instead of 1964-65 would have little effect on the over-all gap filler program and since the RCAF had said it would consider reinstating the program in FY 1963-64 if USAF gave it good enough reasons for doing so, USAF asked for the early reinstatement. Consequently, the RCAF changed its position to deferring the program only until FY 1963-64. The ultimate decision rested with the Canadian Treasury Board, however.

Toward the end of the year, FPS-74 production slipped another two months. Concerned with the continued delays, Electronic Systems Division (ESD) reviewed the program with the Budd Corporation, the contractor. As a result, Budd hired private radar design consultants to evaluate the set. The consultants said that, in time, the radar would meet its performance specifications. In December, therefore, ESD accepted another schedule proposal from the company calling for the delivery of the first production models in July 1963. Budd also offered a price reduction of $10,000 per set to compensate for the further slippage. No production models were to be accepted before the FPS-74 received

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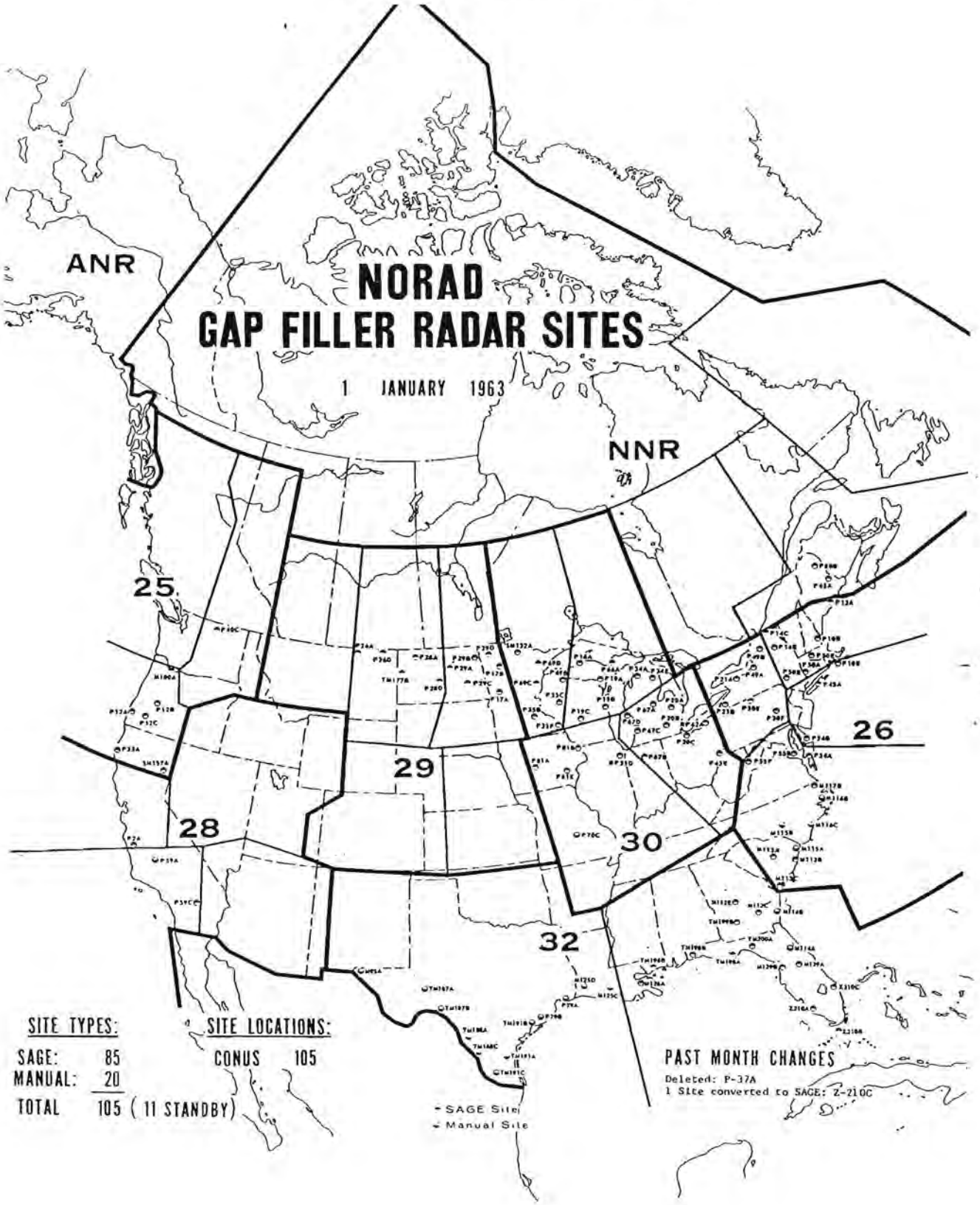
NORAD
GAP FILLER RADAR SITES

1 JANUARY 1963



SITE TYPES:

SAGE:	85
MANUAL:	20
TOTAL	105 (11 STANDBY)

SITE LOCATIONS:

CONUS 105

- SAGE Site
- Manual Site

PAST MONTH CHANGES

Deleted: P-37A
1 Site converted to SAGE: Z-210C

[redacted]

first article approval, however, which was now scheduled for 30 April 1963.

This last schedule, calling for initial production in July 1963, amounted to a total slippage of 12 months, the original schedule having called for initial production in June 1962. It was feared that this additional slippage, and the prospect of more delays to come, would prompt the RCAF to defer associated communications and construction projects. If they did so, the entire FPS-74 program would be jeopardized.

Unfortunately, this schedule did not last long. By the end of January 1963, Budd had announced that it did not expect to produce its first article before July 1963, or its first production model before December 1963.

AEW&C FORCE

RANDOM MANNING

NORAD became concerned in 1961 with the drain on its AEW&C force, caused by the withdrawal of RC-121's to support special projects such as Discoverer, Samos, Blue Straw, and overseas movements. This drain was magnified by a requirement, introduced in 1961, to man a full-time AEW&C station off the coast of southern Florida and by the ALRI (see below) retrofit and test program.

By March 1962, these projects had cut NORAD's ability to man AEW&C stations to only eight (four off the east coast, three off the west coast, and one off Florida) of the required eleven (five off each coast and one off Florida). In an attempt to solve the problem, NORAD and USAF ADC decided to adopt a random manning system for the East and West Coast stations. The southern Florida station would continue to be manned full-time. Both commands felt that, except for the Florida station, full-time manning was not really required in peacetime, anyway.

The random manning system was announced to the regions in July 1962. Primary stations, with the exception of that in Florida, were to be manned on a rotating, random basis thirty percent of the time. The regions were to be ready to man all stations full time if the need arose, however.

Random manning was to start on 1 September 1962, but was delayed until 1 October for review of random manning plans.

ALRI

The Airborne Long Range Inputs (ALRI) program was launched in February 1959 when USAF ADC sent its first ALRI plan to NORAD. NORAD approved the plan in April 1959 and USAF approved on 1 May 1959. A contract was awarded to the Burroughs Corporation on 12 November 1959 to retrofit the RC-121's and install the necessary communications and electronics equipment at the ground stations. Lockheed Aircraft Corporation sub-contracted to do the actual retrofitting.

The initial program called for five ground and five air stations off each coast. The first station was to become operational off the East Coast by July 1961; the first West Coast station was to be operational by September 1961.

By April 1960, however, USAF had cut the ALRI program to one wing (35 aircraft). NORAD chose to make this the East Coast wing, the 551st. USAF also reduced the number of special ground stations from ten to four at the same time. NORAD accordingly drew up a new plan for the ALRI system calling for the first prototype aircraft in January 1961 and the first operational ground station in September of the same year. Phase I testing of the ALRI aircraft was to be finished by May 1961 and Phase II testing by August.

But the program fell far behind schedule. The first prototype ALRI-equipped aircraft did not

actually begin Phase I testing until late June 1961. By the end of 1962, the program was still not out of the testing stage and the number of stations programmed for the East Coast had dropped to four. NORAD was asking for seven more stations - five for the West Coast and two for southern Florida. USAF planned to withhold any further expansion of the system until the East Coast system had been evaluated, however.

Also by the end of the year, the Texas Tower problem added urgency to the ALRI program, since ALRI was slated to replace the towers. The ALRI system had still not been completely accepted by the Air Force, however, and it appeared as if no ALRI stations would be manned before mid-1963 at the earliest.

TEXAS TOWERS

After Texas Tower 4 collapsed in January 1961 during a storm, carrying 29 men to their deaths, USAF ADC set up standards for evacuating the other two towers whenever they were threatened by severe weather. The other two, TT-2 on Georges Bank and TT-3 on Nantucket Shoals, were to be evacuated whenever seas higher than 35 feet were forecast, or when winds reached 50 knots if they were forecast to go to 70 knots. The first evacuation of the towers under these criteria was made on 19 September 1961, and several more took place before the end of the year.

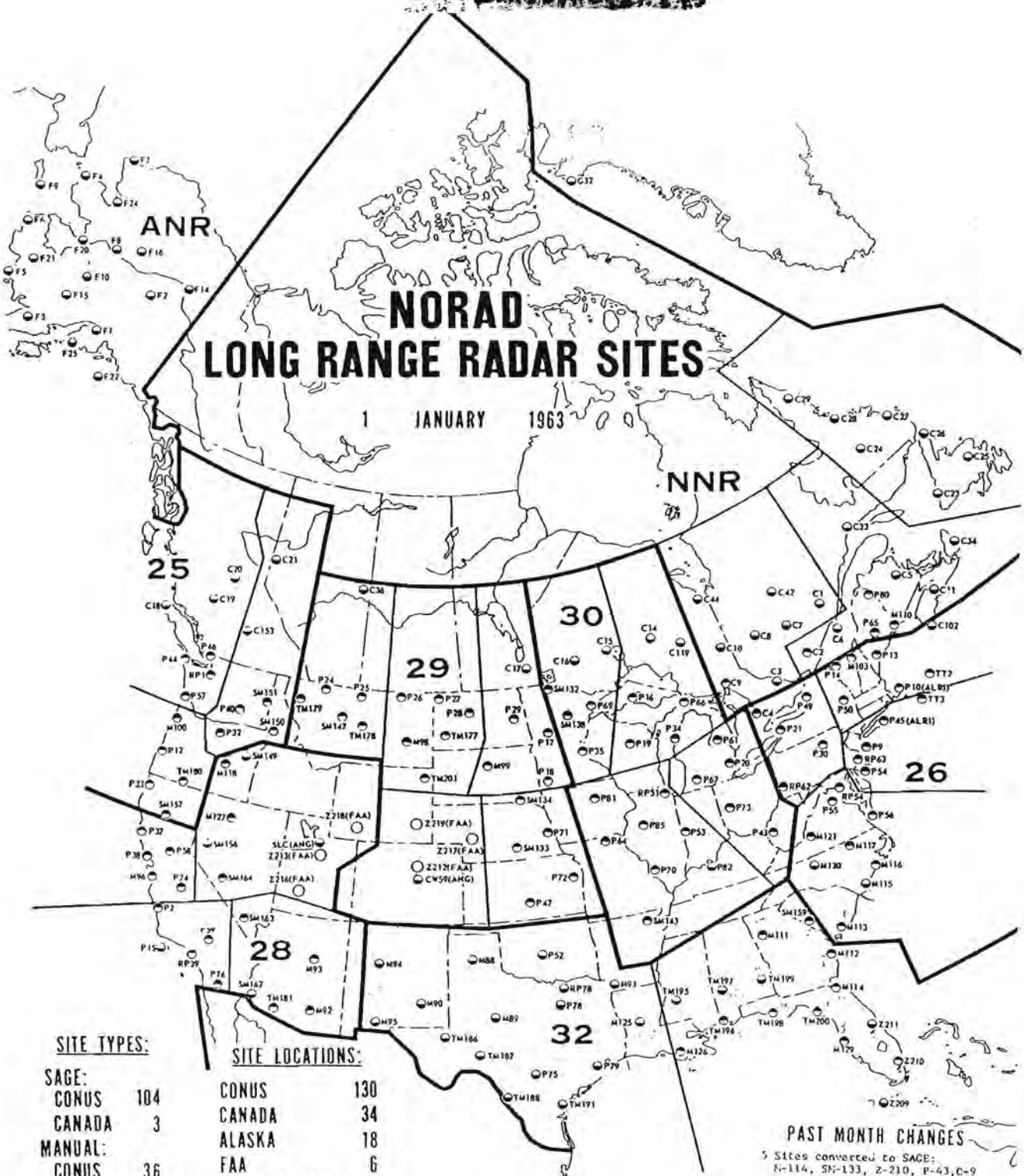
Evacuations continued in 1962. During the 11 months from January to November 1962, TT-2 was non-operative 72 days - 53 days for evacuation, 19 for equipment outages. TT-3 was out a total of 71 days - 35 for evacuation and 36 for other reasons. During the last half of 1962, TT-2 had to be evacuated at least 9 times, and TT-3 at least 8 times, because of storms.

Total evacuation of the towers raised its own problems, however, one of which resulted from their

[redacted]

NORAD
LONG RANGE RADAR SITES

1 JANUARY 1963



SITE TYPES:

SAGE:	
CONUS	104
CANADA	3
MANUAL:	
CONUS	36
CANADA	31
ALASKA	18
THULE	1
TOTAL	193

SITE LOCATIONS:

CONUS	130
CANADA	34
ALASKA	18
FAA	6
TEXAS TOWERS	2
ANG SITES	2
THULE	1
TOTAL	193

PAST MONTH CHANGES

5 Sites converted to SAGE:
M-114, SM-133, Z-210, P-43, C-9

LEGEND

- SAGE Site
- Manual Site
- FAA Site (Surveillance Only)
- II SAGE ops in Mode II only.

[redacted]

location in international waters. Often when the towers were evacuated, Russian trawlers would move in quite close, raising the specter of the Russians boarding the towers and claiming them as salvage. For this reason, the Coast Guard was called on during the latter part of 1962 to patrol the area around evacuated towers and prevent their being boarded.

Meanwhile, another tack was being taken on the problem of leaving the towers "abandoned." The Electric Boat Division of General Dynamics and the Pittsburg-Des Moines Steel Company collaborated on designing and building survival capsules capable of sustaining seven men for 15 days or 11 men for ten days. One of these capsules on each tower would enable ADC to leave a seven-man standby crew on board no matter what the weather.

The capsules were tested on 6 October 1962 and were installed aboard the towers soon after. Testing of the capsules was to continue aboard the towers, but they were available for use in an emergency.

In the meantime, however, the feeling was growing that the towers were becoming more expensive than they were worth. Evacuation was costly, both in monetary expense and in the loss of surveillance. Furthermore, each time a tower was evacuated, an AEW&C aircraft was stationed in the area to partially make up for the loss in surveillance and control. This had to be done at the expense of the regular AEW&C stations.

And storms were taking their toll. In August 1962, the FPS-67 search radar on TT-3 lost its inflatable radome when it was blown overboard. It was replaced by a rigid radome in September. Another storm on 15 November carried away TT-2's garbage chute and damaged the flying bridge suspended beneath its platform.

More serious was the scouring of the ocean floor around the legs of the towers. An October-

November inspection of the ocean floor revealed that the earth and rock in which the tower legs were imbedded had been scoured out ten feet deeper since the last inspection in July 1962.

On learning this, USAF, early in December, directed that the towers not be remanned, except for the seven-man standby crews, until further notice. The towers had been evacuated for a storm on 4 December.

USAF was considering phasing out the two towers early. But the premature deactivation of the two towers would impact decidedly on the air defense system in that area. Lost would be:

a. About 50 nautical miles of low altitude coverage eastward from TT-3 and in every direction from TT-2;

b. Some automatic radar input to the SAGE system, and overlap radar coverage at medium and high altitudes;

c. About 100 nautical miles in BOMARC capability;

d. About 10 minutes warning time against a 600-knot target in terms of automatic inputs to SAGE.

NORAD had previously recommended that the two towers be kept until ALRI stations 2 and 4 demonstrated their reliability in detecting, tracking, and controlling. When faced with the scouring problem, however, NORAD altered this recommendation to one for putting TT-2 on a standby basis with a seven-man caretaker crew aboard, to be remanned if needed, and leaving TT-3 fully manned and operating.

Nevertheless, USAF and JCS decided to phase the towers out early. One reason was that it would have cost at least $250,000 to correct the

scouring at the bases of the towers' legs and it was considered not worthwhile for the few months the towers would remain in operation.

In line with this decision, ADC declared TT-2 excess to its needs as of 1 January 1963. The next day, the JCS authorized immediate deactivation. TT-2 was deactivated 15 January 1963. TT-3 was to remain on standby status with a seven-man crew until it was replaced by ALRI. Until then, the Boston Air Defense Sector was to stand ready to man the station on 24 hours notice if required.

Remaining was the question of when ALRI would be ready to replace TT-3. NORAD wanted TT-3's deactivation to take place only after ALRI had demonstrated a reliable capability. USAF wanted TT-3 to go as soon as ALRI became operational. This difference was yet to be resolved.

DISTANT EARLY WARNING LINE

In August 1962, the Secretary of Defense asked NORAD to review its requirement for the continued operation of radars on the DEW and Mid-Canada Lines. Since it was now probable that an ICBM attack would precede an attack by manned bombers, the Secretary of Defense felt it might be possible to reduce the number of early warning radars along the two lines.

NORAD asked USAF ADC to study the need for DEW Line and MCL radars. Following ADC's completion of the study, NORAD told the Office of the Secretary of Defense that both lines were still needed to prevent bomber attacks within minutes after an ICBM raid on continental targets. But the need for low altitude surveillance had decreased. Also, by October 1962, ADC had finished modifying DEW Line FPS-19 radars to improve their low-level coverage capabilities. Because this ended the need for the FPS-23 low-level surveillance radars along the DEW Line, NORAD recommended that they be deleted. Since DEW Line operations

were covered by a formal U.S.-Canada agreement, however, a final decision on the FPS-23's would have to be worked out between the two countries.

ADC, in its study, was also to look into the possibility of deleting some of the DEW Line FPS-19 radars. It was to base its study on a 50% probability of detecting a single B-47-size aircraft traveling 5,000 feet over the terrain at .9 Mach. No main site or PIN-3 was to be considered for deletion, however. ADC concluded that eight of the main DEW Line FPS-19's could be eliminated plus two or three of the FPS-19's along the DEW Line's westward extension.

The effect on communications of deleting DEW Line radar sites also had to be considered, however. The Commander-in-Chief, Alaskan Command, was particularly concerned with this aspect of the problem since some of the sites proposed for deletion furnished links in an integrated communications system serving several agencies in Alaska. Other sites were important as communications links for high priority projects in the Aleutian area. At the end of the year, therefore, NORAD was compiling information to enable it to compare the savings that would result from eliminating the radar sites to the cost of providing new facilities for communications.

COMMUNICATIONS

NORAD/SAC NORTHERN AREA COMMUNICATIONS OBJECTIVES PLAN

NORAD and SAC submitted a joint Northern Area Communications Objectives Plan (NACOM) to the JCS in May 1962. The JCS had asked for such a plan in January 1960, but it had been long delayed by numerous coordinations and revisions.

The JCS approved the plan on 10 July 1962 and forwarded it to the Defense Communications Agency

(DCA). The DCA was to determine whether the requirements could be met within the defense communications system. For those that could not be met, the DCA was to prepare systems plans and send them to the JCS for approval. The seven basic objectives in the plan, and their status as of the end of 1962, were as follows:

1. A 24-channel tropospheric scatter radio system from Thule, Greenland, to Station FOX (Hall Lake) on the DEW Line.

This system had been programmed and funded by USAF. The expected operational date had originally been February 1964, but this was pushed back to June, then September 1964. At the end of 1962, DCA recommended that the system be either cancelled or studied further because it appeared that it would not meet performance objectives (24 channels). NORAD said it still needed a wideband communications route from Thule to Fox because both present routes were vulnerable to military action, sabotage, and failures caused by natural phenomena. It was also important that the installation of the Thule-Fox system not be delayed since this would in turn delay other northern area communications improvements. DCA then determined that the system would provide four reliable channels throughout the year, with up to 12 channels available for all but two weeks of the year. NORAD and SAC accepted this as adequate.

2. Lateral upgrading of DEW Line communications from BAR Main (Barter Island) to DYE Main (Cape Dyer), to increase the number of channels and improve the system's reliability.

This was approved in two phases. Phase I, upgrading the Cape Dyer-PIN-3 segment, was funded and scheduled for completion in December 1963. Phase II, upgrading the PIN-3-Barter Island segment, was to be funded for FY 1964, and was to be completed in October 1964.

3. Central Canada Tropo Route. A wide-band high-quality voice capability from Station CAM (Cambridge Bay) via PIN-3 (Lady Franklin Point) and Port Radium to Hay River (Northwest Territory).

The system was under contract and scheduled for completion by December 1963.

4. Expansion and upgrading of the existing AN/FRC-47 tropospheric system (DEW Drop Communications) from nine reliable channels to 24 reliable channels.

Major improvements were being deferred until the Thule-Fox tropo link became operational. Minor improvements were to be made which would be completed by April 1964.

5. A high frequency single sideband (HF SSB) radio network to serve as backup to the existing BMEWS rearward communications system.

SSB nets were operational between Thule and the COC and Clear and the COC. Links between BMEWS station and the ALCOP were expected to be operational by FY 1964.

6. A full-period voice or, if voice was impracticable, a full-period teletype circuit to serve as backup to the BMEWS rearward communications system.

The teletype circuit was established between Thule and the COC in December 1961; a voice circuit was established between Clear and the COC in February 1962.

7. A low-frequency point-to-point radio system to fill the immediate need for a long-range survivable national communications system.

The plan was approved by USAF and sent on to DOD. However, DOD disapproved it, stating that various aspects of the proposed system were being tested and USAF could resubmit the plan following the completion of the tests if desired.

CHAPTER 4

BALLISTIC MISSILE AND SPACE WEAPONS DETECTION SYSTEMS

BALLISTIC MISSILE EARLY WARNING SYSTEM

SITE III

Strikes and walkouts continued to delay the operational date of Site III at Fylingdales, England. Originally scheduled to go into operation in March 1963, labor difficulties pushed the date back to April, then June, then September 1963, with the possibility existing that it could be further delayed by inclement weather. At the end of 1962, NORAD expected Site III to reach initial operational capability on 15 September 1963, and to be turned over to the RAF on a sustained operational basis on 15 January 1964.

BMEWS GAPS

BMEWS was designed and deployed to detect missiles with re-entry angles of between 15° and 65°. The USSR, however, had the ability to fire missiles from its territory with re-entry angles of 5°-7°, with small loss in effectiveness.* To plug these low-angle gaps, NORAD, in the spring of 1962, worked out a proposal for a tracking radar at Clear to cover the Sites I-II gap and a gap filler radar either on the north coast of Iceland or the east coast of Greenland to cover the more-important Sites I-III gap. Also required was the use of the Shemya radar to scan to the west of Site II.

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* See NORAD Historical Summary for Jan-Jun 1962, p. 27.

A package containing these proposals was forwarded to USAF on 31 July 1962. Soon after, the Secretary of Defense told USAF to go ahead with the tracker at Clear and to prepare proposals for a gap filler station in Iceland or Greenland. USAF wanted to restudy the requirement, however, and was still studying it at the end of 1962. Also under study was an RCA proposal to locate the Sites I-III gap filler on board a ship operating off the coast of Iceland.

BMEWS REARWARD COMMUNICATIONS

NORAD continued to be concerned over the vulnerability of the BMEWS rearward communications submarine cables, particularly the one terminating at Deer Lake, Newfoundland. This cable was cut in one or more places (presumably by fishing trawlers) in September, October, and November of 1961, causing loss of cable use for 39 days. At the start of the Cuban crisis, a Soviet trawler was sighted directly over the cable. Since restoring a cable took from 10 days to two weeks, a break was no small matter.

Prompted by ADC, NORAD asked the JCS for protection for the cable, preferably consisting of armed sea or air patrol of the cable route. USAF told the JCS that armed patrol of the cable area was not the solution, however. Since the route extended through international waters, force could not be used to remove a Russian trawler without creating an international incident, and mal-intent would be difficult to prove. BMEWS rearward communications could be substantially affected only by the simultaneous cutting of all cables. Because of the extreme unlikelihood of such occurring accidentally, this eventuality could be used as a basis for reacting. But Soviet trawlers could not be kept from the area legally and the outage of one cable, even though a Soviet trawler was in the area at the time, could not be used as a basis for acting.

And USAF earlier had indicated that it didn't think the BMEWS rearward communications problem particularly desperate. USAF pointed out that even during the 1961 outages, communications had been maintained with Thule by teletype and since then further backup had been provided through an SSB (Single Side Band) net. Also, additional backup was being provided by a SAC aircraft operating in the Thule area on an almost continuous basis.*

BMEWS ALCOP

As BMEWS rearward communications routes increased, so did NORAD's concern over the fact that all terminated at one spot -- the NORAD COC in Colorado Springs. All the efforts to increase the reliability and survivability of the BMEWS communications system could be wiped out by a malfunction or other problem at Colorado Springs.

USAF ADC, therefore, asked AFSC's Electronic System Division to look into the possibility of locating an alternate BMEWS CC&DF (Central Computer and Display Facility) in the hardened North Bay facility. The RCAF had already approved in principle the idea of locating the NORAD ALCOP at North Bay. If room was not available at North Bay, ADC asked that an interim facility be set up at Richards-Gebaur AFB, Missouri (site of the current NORAD ALCOP), until space in a hardened facility could be found.

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* See also page 28 for BMEWS communications matters.

BMEWS RANGE DEFICIENCY

NORAD also continued to be concerned over BMEWS' virtual inability to detect objects beyond a range of 1500 nautical miles. This deficiency greatly increased the possibility that ballistic missiles launched from the southern part of the Soviet Union or launched at high angles would escape BMEWS detection.

NORAD's requirement to extend the BMEWS range was broadened in the last half of 1962 to include a system not only for ERBM's (Extended Range Ballistic Missiles) and high-angle ICBM's but also for the detection of all satellites on their first orbit. NORAD felt that this would avoid a piecemeal approach to similar problems which was particularly desirable since the ERBM threat was not important enough to warrant by itself a system of questionable capability. What NORAD wanted was a system in the southwest Pacific and Indian Oceans that could detect and track both missiles and earth satellites. And NORAD wanted the system integrated with SPADATS when it went into operation. The Defense Department asked both the Air Force and the Navy to study the possibilities of such a system.

Several other devices were being looked into to provide earlier ballistic missile warning, among them:

a. The installation of parametric amplifiers on detection radars.

b. An improved Klystron tube for BMEWS radars.

c. A phased-array system.

d. A system of over-the-horizon detection by backward and forward scatter.

Attention was given to a forward scatter system. NORAD felt that development of the system

should be "vigorously pursued." Though NORAD did not feel that forward scatter data alone could be used to base a reaction on, it thought the new system would give added credibility and earlier warning to the BMEWS system.

Several industry proposals involving forward scatter were made, among them a Raytheon Corporation proposal to the DOD that a forward scatter detection system covering the critical launch areas of Russia -- those areas associated with the Russian rail system -- be set up. The cost of the Raytheon system would be $40 million, including $8 million for operating the system for the first year. There were problems in the system yet to be ironed out, however, and NORAD felt that such a system for NORAD use would not be operationally feasible for several years.

BMEWS ECCM

In October 1961, USAF had authorized $160,000 for "quick fixes" to give BMEWS a limited ability to recognize when it was being jammed. The fixes included noise monitors, test target generators, and ECM simulators. By mid-1962, the "quick fixes" had been installed at Sites I and II.

But a BMEWS ECCM capability required more than just the "quick fixes," and in March 1962 USAF approved a $43.3 million BMEWS ECCM program and sent it on to DOD for approval and funding. Specifics of the program were:

a. Doppler Filter Display and Blanking.

b. Narrow Band Frequency Shift (to provide manual control over the "moon fix").

c. Wide Band Frequency Shift.

d. Side Lobe Cancellors.

e. ECM Monitor.

f. Central Data Processor Expansion (e. and f. to be used in conjunction with the test target generator).

g. Polarization Selection (horizontal-vertical) (to provide selective blanking).

When the estimated cost for these fixes rose to $52 million, however, DDR&E placed a hold order on the program and told USAF to reduce its cost back to the $43 million vicinity.

NORAD believed it essential to provide the BMEWS system with protection against ECM if only to force the enemy into resorting to further ECM actions that could be used as a more reliable basis for reaction. NORAD, therefore, reiterated its requirement for wide band frequency shift and doppler filter blanker fixes at all three BMEWS sites, and for the multiple side lobe cancellor at the Thule and Clear sites.

The Secretary of the Air Force in November 1962 approved $18.5 million for FY 1963 and $5.2 million for FY 1964 for BMEWS ECCM modifications and sent the program on to DOD for approval. Added to the $4.3 million already approved for FY 1962, this would make a total of $28 million if it was approved. The Air Force program provided for all the fixes contained in the original $43.3 million program except for production funds for the side lobe cancellor. Funds were provided for a prototype side lobe cancellor, with the purchase of more units to be held up until the prototype was tested. Furthermore, though funds for the wide band frequency shift fix were provided, they were not to be used until the results of a comparison study of the wide band frequency shift and the pulse compression techniques were in. The cost of both systems was about the same.

SPACE DETECTION AND TRACKING SYSTEM

BAKER-NUNN CAMERAS

Baker-Nunn cameras to augment SPADATS in providing data on satellites and space vehicles played a big role in NORAD's efforts to improve the SPADAT System. Though the Baker-Nunn cameras had at least two shortcomings -- they could operate only in clear weather and they could not provide real time, or instant, data -- they were still the most advanced optical instruments available. Where radar was presently limited to a height of about 3,000 miles, Baker-Nunn cameras could track similar targets to ten times that distance. They could even be used for tracking lunar and interplanetary vehicles for as long as 48 hours after launch. Additionally, Baker-Nunn cameras were more accurate than radar.

There had been five Baker-Nunn cameras in the Air Force inventory, but of these, one had been given to Canada in mid-1962 and another was slated to be given to Chile. The remaining three were to be transferred to the National Aeronautics and Space Administration (NASA). Around the first of 1962, NORAD managed to delay the transfer of the three to NASA and sought ways to continue to get data from the cameras to be given to Canada and Chile.* Arrangements were worked out with Canada for using their Baker-Nunn camera and the handover of the other camera to Chile was held up because of complications, namely prospective Russian observers.

In July 1962, USAF asked ADC to draw up a plan for the integration of Baker-Nunn cameras into the NORAD SPADAT System. ADC's plan was to consider all or any lesser number of the 17 Baker-Nunn cameras extant. This total included the five USAF cameras (including the Canadian and Chilean cameras) and 12 cameras being operated by the Smithsonian Astrophysical Observatory (SAO) in support of NASA.

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* See NORAD Historical Summary, Jan-Jun 1962, pp. 32-34.

In its request, USAF also advised ADC to base its justification on operational grounds rather than on research and development projects, and, in the case of the cameras planned for off-shore locations, to try to place them at U.S. bases having complete support facilities. Furthermore, ADC was to determine SPASUR's requirements for Baker-Nunn cameras.

ADC submitted its plan in September 1962, calling for a basic seven-camera network, plus the RCAF-operated camera at Cold Lake, Alberta. The current location of the seven cameras and their use and ADC's recommendations for them were as follows:

Location	Use	Action Required
Edwards AFB, Calif.	AFSC Research Facility	Transfer to ADC
University of Oslo, Norway	SPADATS Sensor, under ADC contract	Continue current contract
Maui, Hawaii	SAO operation	Transfer to DOD when relinquished by SAO
Mitaka, Japan	SAO operation	Same as above
Woomera, Australia	SAO operation	Same as above or have RAAF operate it in response to SPADATS
Santiago, Chile	Not operating	Renew contract with U. of Chile or relocate in South Atlantic (Ascension Island)
Camera in storage		Locate in South Pacific (New Zealand, Samoa, Fiji Is., or Tahiti)

The ADC plan also provided for acquiring additional NASA-SAO cameras as they were phased out of the SAO system, but ADC suggested that none of this be done until the basic seven-camera net was operating. Even then, the ADC plan called for additional cameras only if they were essential to the SPADATS operation.

The ADC plan also took into consideration the project to develop an optical sensor that would overcome most of the limitations of the Baker-Nunn cameras. This was the prototype automatic electro-optical deep space surveillance and tracking facility being built at Cloudcroft, New Mexico, by the Radio Corporation of America.* The new sensor would be able to scan as well as track, and its associated equipment would permit the reduction and reporting of data almost instantly. The prototype of the new system could not be built for another year or two after that. Furthermore, since the new sensor would not be as accurate as the Baker-Nunn cameras, the need for the latter in special cases would continue.

NORAD concurred with the seven-camera network, stating at the same time that additional cameras probably would not be worth the additional expense. NORAD also mentioned the fact that SPASUR had need of one (later increased to two) Baker-Nunn camera to calibrate the SPASUR fence. Since the cameras would have to be placed along the fence, which extended from coast to coast through the southern U.S., none of the cameras in the proposed seven-camera net could be used for this purpose.

The Secretary of the Air Force and the JCS also concurred in ADC's plan. Both offices further agreed that a decision on the acquisition of more cameras than the basic seven should be withheld

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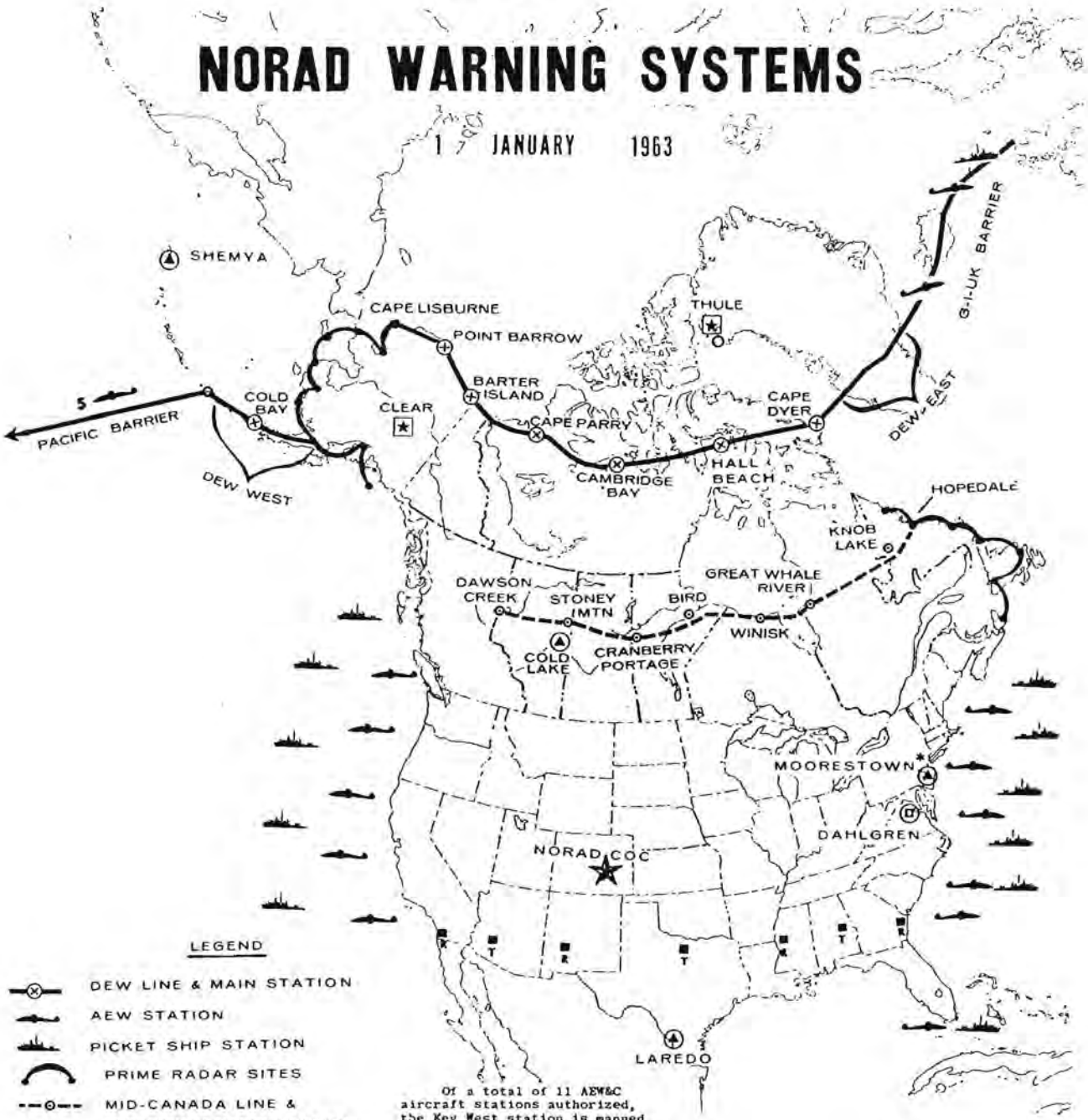
* See NORAD Historical Summary, Jan-Jun 1962, pp. 30-31.

NORAD WARNING SYSTEMS

1 7 JANUARY 1963



LEGEND

- DEW LINE & MAIN STATION
- AEW STATION
- PICKET SHIP STATION
- PRIME RADAR SITES
- MID-CANADA LINE & SECTION CONTROL STATION
- THULE AC&W RADAR
- BMEWS SITE
- SPADATS SENSOR
- NAVSPASUR FACILITY
- NAVSPASUR: TRANSMITTER (T) RECEIVER (R)

Of a total of 11 AEW&C aircraft stations authorized, the Key West station is manned full time; under normal readiness conditions, 30% of the remaining 10 stations will be manned on a random rotating basis.

Of a total of 11 picket ship stations authorized, 10 are manned – 5 off each coast.

Notes

- Reports to both COC and SPADATS Center
- Reports to SPADATS Center
- Part-time operations

until the effectiveness of the basic complex was demonstrated. The ADC plan with its various indorsements was passed on to the Secretary of Defense.

In the meantime, the camera at Cold Lake, operated by the RCAF, began supplying data to the NORAD SPADATS Center in mid-1962. The camera was scheduled to become fully operational within the system on 1 November 1962, but because of training considerations at the site this date was pushed back to 1 March 1963.

TRINIDAD SITE

Late in 1962, NORAD began taking steps to obtain control of the Trinidad tracking facility for SPADATS use. Trinidad had been supporting SPADATS on a more or less parttime basis, but had been under the control of AFSC's Air Force Missile Test Center (AFMTC) at Patrick AFB, Florida.

NORAD had considered the Trinidad radar essential to the SPADAT System since 1960, a position confirmed by operational experience throughout 1962. Its near-equatorial location permitted the observation of all earth satellites, regardless of the inclination of their orbits. The site could track Soviet launches before their first pass over the North American continent, could observe launches at 49° on their first orbit, and launches at 65° on their fourth or fifth orbits.

And NORAD felt the sensor was more ideally suited for space surveillance than for missile range operations. NORAD pointed out that 89% of Trinidad's operational time was spent on SPADATS operations, and that SPADATS' use of the facility would increase as space activity accelerated. Finally, Trinidad in its SPADATS role could continue to support other agencies, including missile range users, without difficulty.

The Trinidad sensor suddenly became even more important to SPADATS in the fall of 1962. Late in October, soon after the eruption of the Cuban crisis, the Moorestown and Laredo radars were withdrawn from SPADATS and realigned to provide missile surveillance over Cuba. This prompted NORAD to put in an urgent request for the use of the Trinidad tracker for SPADATS support.

Apparently as a result, USAF, early in November, gave ADC the authority to call up and use the Trinidad radar for a two-week period ending on 16 November. USAF pointed out, though, that Trinidad was operating on only a two-shift basis, so ADC should not ask for the radar's use unless it was absolutely essential.

Meanwhile, NORAD and AFSC were attempting to arrive at an agreement for turning the Trinidad tracker over to ADC on a permanent basis, with NORAD maintaining full-time operational control. In December 1962, NORAD formally asked the JCS for operational control of Trinidad, with operational command going to CONAD. ADC was to operate the system. Approval had not been received by the end of the year, however.

TURKEY SITE

Plans were being made at the end of 1962 for NORAD to assume operational control of the radar site at Dyarbakir, Turkey. The site, consisting of an FPS-17 fixed-beam radar already installed and an FPS-79 tracker radar in the process of being installed, would be operated by ADC as part of the SPACETRACK system to gather both SPADATS and intelligence data.

For data to be of any value, NORAD had to have communications lines flowing directly from the Turkey site to the NORAD COC. In October, therefore, NORAD asked the Defense Communications Agency (DCA) to be ready to provide the communications

service needed should the plans be approved. NORAD wanted two circuits in the Trans-Mediterranean Tropo System that would be immediately responsive to SPADATS needs on a 24-hour basis -- a full-period unclassified voice circuit and a full-period secure duplex 100 WPM TTY -- extending from Turkey to the NORAD COC.

Also in October, NORAD discovered that the planned configuration for the Turkey site would not satisfy NORAD requirements for tracking and timely signature analysis data. NORAD's specific requirements were:

1. Position data on all targets in the tracker beam;

2. An on-site computer to provide object correlation and acquisition data;

3. The two communications circuits mentioned above;

4. Automatic handover of targets from the FPS-17 to the FPS-79;

5. Re-acquisition capability for the FPS-79;

6. Automatic position data readout on teletype tape for immediate transmission;

7. Timely signature analysis of all targets within the tracker beam;

8. Transmission of the above data within 30 minutes of observation. These deficiencies were in the process of being resolved by the contractor.

PARL SITE

Although the radar at the Canadian Prince Albert Radar Laboratory (PARL) was cooperating with

the NORAD SPADAT System, its contribution was less than NORAD would have liked. The facility was controlled by the Canadian Defence Research Board (DRB), a fact that discouraged the setting up of a classified communications line to it. NORAD, therefore, could get no information from the radar of a classified nature.

To overcome this problem, NORAD suggested to USAF in December 1962 that when the loan of the U.S. equipment to PARL was re-negotiated some thought be given to putting it in the hands of the RCAF. This arrangement would enable DRB to continue to use it, but would put the facility on a more operational basis permitting greater participation in the SPADAT System.

MISSILE DEFENSE ALARM SYSTEM (MIDAS)

The MIDAS program remained in a research and development status throughout the last half of the year, with no prospect of an early change. USAF proposed a funding plan to DOD calling for $169 million for FY 1963, $205 million for FY 1964, and $192 million for FY 1965. In October, however, the Secretary of Defense authorized only $100 million for FY 1963, and indicated that the Air Force could expect only about $50 million for each succeeding year through FY 1968.

The only significant gain registered by the MIDAS program during the last half of 1962 was a DDR&E (Director of Defense Research and Engineering) decision that MIDAS was technically feasible. Although the objections to MIDAS on the grounds of technical feasibility were withdrawn, DDR&E insisted that the program needed further operational justification.

SUBMARINE LAUNCHED BALLISTIC MISSILE DETECTION

One of the most actively investigated possibilities for obtaining the needed SLBM warning

system quickly was that suggested by the use of modified FPS-35 FD radars. A test of two FPS-35 radars containing Sperry-Rand Corporation modifications designed to give the radar an ability to detect and warn against SLBM's was carried out in August and September of 1962 at the Manassas, Virginia, and Benton, Pennsylvania, sites.

The performance of the Sperry-modified FPS-35's was less than satisfactory, however. It turned out that the modified FPS-35's in an operational system would have a range of only 500 nautical miles, instead of the expected 1,000 miles. This would give less than four minutes warning. And at 500 miles, there was only a 50% probability of its detecting SLBM's, instead of the desired 95%. Furthermore, the system could not be ready before 1967, two years later than desired.

Because of the discouraging results of the Sperry-Rand test, AFSC's Electronic Systems Division (ESD) recommended that this particular project be dropped. In its place, ESD offered a proposal of its own based on a second Sperry-Rand proposal --add a 60-foot dish to the FPS-35 and use the FPS-35 backup transmitter. ESD claimed this system would give a range of 1200 nautical miles against one square meter objects and 1500 nautical miles against Polaris-type 2.5 square meter objects. NORAD considered this the best solution being proposed for a quick system. ESD was to conduct a system design study on its proposal.

Near the end of the year, SAC proposed the use of FPS-49 radars for SLBM detection. The FPS-49, SAC pointed out, had been designed expressly for detecting ballistic missiles. They would provide both a credible system and one with a high probability of detection. SAC further stated that the system could be ready within 24 months, giving an operational capability by 1965. No development program would be needed and the system would cost less than the $100 million recommended by a DOD study group as a ceiling for an SLBM warning system.

Another FD radar already in the inventory that was being looked into as a means of SLBM detection was the FPS-26. Aviation Corporation of America (AVCO) proposed that 18 of the 72 FPS-26's installed or programmed for the U.S. be modified to provide complete SLBM coverage of the U.S. periphery. The radars would be modified by adding parametric amplifiers to increase their sensitivity and filter gates to extend their range out to an estimated 1,000 nautical miles. The program would take 18 months from go-ahead.

It seemed doubtful, though, that any line-of-site radar would provide a system with range enough to give useful warning. For this reason, NORAD was interested in various over-the-horizon projects, among them forward scatter and Magnetic Drum Recording Equipment (MADRE). Both of these were still in research and development status, however, as were several other over-the-horizon surveillance and detection techniques.

Page 47-48
not Declassified
as of 17 Oct 2006
& 14 Dec 2006

BIOLOGICAL AND CHEMICAL RAPID WARNING SYSTEM

INTERIM SYSTEM

NORAD submitted a requirement to the JCS in May 1961 for an automatic biological and chemical rapid warning system, which was approved in October 1961. NORAD wanted it to be operational by the end of 1963. The Department of the Army was assigned the responsibility for providing this system as soon as possible. However, the JCS stated that an automatic system, in its entirety, could not be completed by the end of 1963, but that a modified system could possibly be operational by that time.

The JCS directed the Chief of Staff, U.S. Army, in January 1962 to establish an interim system, pending availability of an automatic system. CINCNORAD was to assume and exercise operational control over these systems as they became operational.

In May 1962, NORAD was advised that the Chemical Corps had completed its plan for the interim system. However, at a briefing held 8 June to review the Chemical Corps plan, the latter was found to be not suitable for the intended purpose, and the Army directed the Chemical Corps to re-do the plan.

In late July 1962, the responsibility for writing the over-all plan to establish the interim system was transferred to the Policy and Doctrine Division of the CBR Directorate (DCS/Ops, U.S. Army, Washington, D.C.) from the Chemical Corps Training School at Fort McClellan, Alabama. The new agency provided a draft plan for the interim system to NORAD on 25 September 1962.

In general, the interim system was to be primarily a manual system based upon observations and judgment of trained personnel, augmented by standard equipment currently available, and reporting through

the NORAD communication network to CINCNORAD. Emphasis was placed on the fact that the value of the interim system depended upon the availability of BW/CW trained personnel and a reporting system.

Specific points in the draft plan were:

1. Chief of Staff, U.S. Army, Chief of Naval Operations, Chief of Staff, U.S. Air Force and Commandant of the Marine Corps would provide personnel, logistical and other administrative support for the system, and each service would initiate programming and budgetary actions to provide required funding in sufficient time to avoid delay in implementing the system.

2. Chief of Staff, U.S. Army would establish the system.

3. USCONARC would be designated as the Army action agency to establish and test the system, determine when the system was operational, and then pass operational control to CINCNORAD.

4. CINCNORAD would prescribe the mode and means of communications, assume operational control over the system when it was established and tested by the Army, and evaluate and disseminate BW/CW data derived from the system.

5. A minimum of three trained individuals, one of which would be a commissioned officer, would be required at each installation.

6. This system would be placed in operation and tested within one year of the effective date of the CBR Directorate's proposed plan, although all the required equipment would not be available by that time. However, personnel would be trained, and reporting procedures and system responsiveness would be tested.

NORAD recommended several specific changes. In general, NORAD felt that a group representing

the interested agencies should prepare, in conjunction with NORAD, a draft operations plan to guide the initial operations and testing of the interim system, and provision should be made for a joint task group to conduct and evaluate an eventual system test. In accordance with NORAD's suggestion, comments received from the various services and other interested agencies were incorporated into a revised draft plan, which was informally approved by the military services.

At the end of the year, the proposed schedule for implementation was as follows:

1. Training of detection units, conducted by USCONARC, would commence 1 October 1963 and be completed by March 1964.

2. All required equipment would be available at the installations by March 1964.

3. The warning system would be turned over to NORAD 1 July 1964.

AUTOMATIC SYSTEM

The Department of the Army recommended development of an automatic system in four phases over a period of approximately five years. However, initiation of the four-phase program was being held in abeyance by the Deputy Director of Defense, Engineering and Chemistry. That office directed a complete system analysis to further define and clarify the entire project.

This study (system analysis) to be performed by a contractor, was to be completed within 9 to 12 months from the date of the contract which was to be let by April 1963. A project manager had been provided from the Chemical Corps for the study and the development, procurement, and implementation of the entire automated BW/CW system.

In compliance with JCS directive, Headquarters NORAD had queried the Canadian Chiefs of Staff Committee on 24 May concerning Canada's desire to participate in the BW/CW Rapid Warning System Program. On 6 September, the Department of National Defence advised CINCNORAD that they were currently studying BW/CW and further information on the Canadian position would be forwarded upon completion of the study.

CHAPTER 6

COMMAND AND CONTROL

PRIMARY FACILITIES

NORAD UNDERGROUND COC

Excavation in Cheyenne Mountain for the underground COC was completed by the end of the year. Design of the internal structures was also completed. This had been delayed by the need to redesign the electrical power areas and provide protection against the electromagnetic pulse effects of nuclear explosions.

The construction of the internal facilities was to be done in two phases, under two different contracts. Phase II involved all internal construction except for the operations and technical areas. Phase IIA involved the operations and technical areas. Phase II construction was to be completed by the middle of July 1964; Phase IIA construction was to be completed by 1 August 1964. The deferral of about $10 million in FY 1964 funds, plus a slippage in design and construction schedules, was expected to prevent the underground COC from reaching initial operational capability until mid-1965, however.

As development of the underground facility progressed, it became increasingly clear to NORAD that the scope of the command and control system considerably exceeded the responsibility and authority of the 425L System Project Office. Many other independently managed "L" systems, such as 433L, 438L, 474L, and 496L were going in, and they had to be integrated or interfaced with the central data processing and display complex to provide the highest degree of operational effectiveness.

NORAD, therefore, suggested that some sort of over-all manager be designated to schedule the "L" systems into Cheyenne Mountain and provide coordination among the different system contractors. The manager could also coordinate with the Air Force Regional Civil Engineer to avoid conflicts between construction contractors and "L" systems contractors. NORAD suggested that the logical choice for such a manager would be the Air Force Systems Command.

425L Computer. The original choice of computers for the underground COC had been primarily between the Burroughs D-825 and the Philco S-2000. The Philco computer was chosen by AFSC because of doubt on the part of the MITRE corporation, the Air Force technical advisor, as to the Burroughs computer's capability. MITRE also doubted that Burroughs would be able to meet the 425L system timetable.

When Burroughs actually began producing its D-825 in the fall of 1962 and the computer had partially demonstrated its capability, NORAD asked AFSC to take another look at the choice of computers. AFSC said they still doubted that Burroughs could meet the 425L schedule. Furthermore, to change the choice of computers would require the Systems Development Corporation to work up a new program for the Burroughs computer, which would result in a delay of from six months to a year. Therefore, AFSC said that selection of the Philco S-2000 was firm.

The Philco 2000 computer for Group II (the prototype system) arrived on schedule. The contractor began installing it into the Group II building on 26 October and testing it on 9 November. The computer was accepted early in 1963.

425L Display System. A poll of industry by Burroughs, the 425L contractor, revealed that no display system existed in a near off-the-shelf status that would meet NORAD requirements for the

underground COC. Where NORAD needed a near real-time display directly driven by the computer, the only type available involved photographic-projection techniques. NORAD, therefore, stated that this inferior display system would be acceptable for the prototype 425L system (the Group II facility at Ent AFB) but that a more sophisticated display system was to remain the goal for the underground COC.

425L Communications. NORAD submitted its justification for the planned NORAD 425L communications subsystem telecommunications to the JCS on 23 August 1962. NORAD based its plan on providing the underground COC with a survivable communications system.

NORAD recommended that the system be identified as a NORAD tactical facility that was local in nature and not a part of the Defense Communications System. The JCS approved the over-all requirement in December, but disapproved the recommendation that the system not be a part of the Defense Communications System.

BACK-UP AND PROPOSED FACILITIES

ALTERNATE COMMAND POST (ALCOP)

Background. In October 1960, the JCS directed all unified and specified commands and the services to have alternate command elements in hardened, dispersed, or mobile facilities by 1 July 1961. The purpose was to insure survivability and continuous exercise of command under conditions of general war. The JCS directed that plans be submitted which would include organization of the alternate command element, terms of reference, and prelocation plans.

In response, NORAD revised its ALCOP plans and included a means for reconstitution of Headquarters NORAD at the ALCOP through a Strategic Alert Cadre

from NORAD staffs at Colorado Springs. Also, NORAD and ADC prepared a plan for improving the existing ALCOP at Richards-Gebaur AFB. Finally, as a further effort to assure continuity of command and control, NORAD designated the 30th NR, Truax Field, Wisconsin, as its secondary ALCOP.

However, USAF rejected the NORAD/ADC plan to modernize the ALCOP at Richards-Gebaur because of the questionable survivability of this facility. USAF was seeking a more suitable alternate facility and asked NORAD's and ADC's opinion on using the hardened SAGE DC/CC at North Bay, Ontario. Both ADC and NORAD supported this approach. USAF then queried RCAF Headquarters for its views and asked for approval in principle. In the meantime, at the request of NORAD, a study was underway by the MITRE Corporation called SNOCAP (Survivable NORAD Emergency Capabilities).

Status of Proposal to Use North Bay Facility. On 24 July 1962, the MITRE Corporation presented its findings on SNOCAP to NORAD. It recommended that a NORAD ALCOP be established in the RCAF hardened facility at North Bay and that Airborne Radio Relays be provided to insure survivable communications.

A later development in the SNOCAP study was that in addition to an eventual, fully automatic ALCOP, it was probable that an inexpensive manual ALCOP capability could be provided in the North Bay excavation in a very short period of time. This manual ALCOP could be developed into the final configuration by gradual augmentation of functions and automation.

On 23 October, the RCAF agreed in principle to the concept of locating the ALCOP at North Bay. At the same time, RCAF requested representation in

the design study group to insure a final design acceptable to all concerned.

The sequel to the MITRE recommendation and the RCAF acceptance in principle was that on 9 November, USAF directed AFSC to proceed immediately with an ALCOP design study and implementation plan for using the North Bay facility.

As matters stood at the end of the year, the plan was under development by NORAD/ADC and ESD/MITRE, with USAF and RCAF participation, for an early manual capability which would be upgraded to an automatic ALCOP some time later. However, funding for the North Bay manual ALCOP had not been provided and on 4 January 1963, NORAD requested USAF to provide funds.

Disbandment of the Strategic Alert Cadre. As mentioned, NORAD had set up a strategic alert cadre designed as a nucleus around which the NORAD Headquarters could be reconstituted at the ALCOP. However, a NORAD staff study recommended disbandment of the strategic alert cadre on the grounds that it did not contribute to the survival of NORAD's ability to exercise command and control. The NORAD ALCOP COC and CRC were already fully manned and capable of assuming NORAD command and control functions at any given moment. The ALCOP Commander had the authority to transfer his region functions to his own ALCOP, allowing himself and his staff to devote their energies to NORAD functions. The staff study recommended a small cadre for the Airborne Radio Relay Command Post.* As a result, the

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* NORAD staffs were working on a NORAD Qualitative Requirement for a proposed Airborne Radio Relay System which would tie the primary or alternate command element back into the NORAD system, should communications be destroyed. To gain additional survivability, it was also proposed that the ABRR System be tied into the National Emergency Airborne Command Post.

strategic alert cadre was disbanded in December 1962.

BACKUP INTERCEPTOR CONTROL (BUIC)

Background. The Secretary of Defense told the JCS in June 1961 that USAF and DOD studies had agreed that a missile attack on SAGE and other vital elements of NORAD's command and control system could destroy NORAD's ability to carry out its mission. Although the Secretary said the present SAGE system would be retained for its peacetime and pre-battle advantages, further air battle augmentation of the system was to be stopped. The money saved and money subsequently funded was to be used to build a survivable backup control system.*

USAF stated on 1 November 1961 that the backup system would be installed in two phases. Phase I was to provide a manual control similar to the pre-SAGE operation; Phase II was to provide semi-automatic control at selected radar sites. Thirty-four sites were authorized. The costs for Phase II were to be held to $100 million.

The Secretary of Defense approved the two-phased plan on 13 March 1962. He directed implementation of Phase I as soon as possible and gave authority to proceed with Phase II providing the costs remained within the $100 million limit. The initial equipment buy was to be for only 17 NCC's.

The Air Force announced at the end of June 1962 that the Burroughs Corporation had been selected as the source of the BUIC (Backup Interceptor Control) system.

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* See NORAD/CONAD Historical Summary, Jul-Dec 1961 and Jan-Jun 1962, for further background including NORAD proposals and 416L reorientation for funding.

The USAF Specific Operational Requirement 79, 16 April 1962, included support of that portion of NADOP 64-73 which established a requirement for increasing the survivability of the current continental aircraft control and warning system. Specifically, it provided for the BUIC system. The SOR stated that the improvements specified would be fully implemented by the end of 1965. NADOP 64-73 stated that the 34 automated NCC's would be operational in FY 1964-65.

Status. NORAD's Operations Plan 1-62, Backup Interceptor Control (Modes III and IV, Phase I Manual), 15 February 1962, as amended on 30 January 1963, listed a total of 27 NCC's (NORAD Control Centers) in Phase I. An initial operational capability had been achieved by the end of CY 1962 in the CONUS. However, some matters remained to be cleared up in the 30th Region and RCAF participation remained to be settled. Final operational capability was to be reached in the last half of CY 1963.

By the end of the year, it was seen that the expected and hoped for operational date for the first increment of Phase II sites would be delayed. The final operational date for the first Phase II site had slipped from October 1964 to April 1965. The delay was caused primarily by the Systems Development Corporations' late delivery of an operational computer program. But a complicating factor was the matter of whether NORAD's TRACE plan would be approved.

TRANSPORTABLE AUTOMATED CONTROL ENVIRONMENT (TRACE)

In the meantime, NORAD developed a new concept for an even more flexible and survivable system, based on the BUIC design, which it proposed to be the primary system, replacing SAGE. This new system was called TRACE by NORAD and it was essentially the BUIC Phase II system expanded in capacity and given transportability. NORAD formally presented its proposal for TRACE to the Secretary of Defense in September 1962 in response to requests for data

from the latter in August concerning manned bomber defense. No decision on TRACE had been received by the end of 1962.

The TRACE Plan. The TRACE system, as described in this September submission, would require four more units, or NCC's, than would BUIC II, giving TRACE 38 NCC's in 9 TRACE Sectors.* These would replace the present 22 SAGE sectors in the U.S. and Canada. In addition to replacing the SAGE sectors, the TRACE system would provide semi-automatic control within the Denver-Salt Lake City area. The 10th sector in the command and control system, the Oklahoma City Sector, would continue as a manual sector.

Each TRACE sector would be about 700 nautical miles square and contain a number of TRACE NCC's.** Two TRACE NCC's would be tied in with each group of seven prime radars. TRACE NCC's would also be able to tie in with other radars as well, but not normally more than seven at any one time.

The sector commander and his staff would establish the headquarters at one of the TRACE NCC's within his sector, and would normally conduct sector operations from this point. The commander could choose any of the NCC's within his sector as a headquarters location since virtually all the TRACE NCC's would have identical equipment and capability.

Intermediate headquarters between the TRACE sector headquarters and NORAD headquarters would be appropriate NORAD region headquarters, of which there would be four -- at McChord AFB, Washington (Western NORAD Region), Truax Field, Wisconsin (Central NORAD Region), Hancock Field, New

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* This was described to the JCS in January 1963 as consisting of 10 TRACE sectors and one manual sector.

**Three to four according to the January 1963 description.

York (Eastern NORAD Region), and North Bay, Ontario (Northern NORAD Region). Each of these headquarters, except for that at the hardened North Bay facility, would have a battle staff ready to move to a more survivable operating location when a BMEWS warning was received.

Each of the TRACE NCC's would be transportable, moving its computer, display and communications equipment around on a random schedule to three or four pre-scheduled and prepared positions within its area in four 8-by-10-foot vans. These prepared positions were to be within daily commuting distance of a central support base. This mobility would increase significantly the number of missiles needed to destroy the NCC's.

The TRACE NCC's would constitute the primary air defense system, replacing the SAGE direction centers. But TRACE would continue to use SAGE sensors, data processing equipment, communications facilities, and procedures.

ARADCOM elements would be tied into the system exactly as proposed in the BUIC II plan. Seven of the older BIRDIE's and all 10 Missile Masters would be phased out because of their vulnerability to ICBM attack, however. They would be replaced by 10 newer BIRDIE's (BIRDIE II's) being proposed by ARADCOM. These would constitute the AADCP (Army Air Defense Command Post) element in TRACE.

TRACE communications survivability and flexibility would be achieved through the use of switching centers (see below). Each TRACE NCC would have to have communications ties to the seven radar sites and with adjacent NCC's. Each TRACE unit would be tied into at least two switching centers. TRACE would also use modified B-57 aircraft as airborne radio relay links to reestablish severed communications.

Changing from the SAGE to the TRACE system would have to be done with the least possible loss of combat effectiveness, the fewest communications

and operating changes, and in the most economical manner possible. NORAD's transition plan was based on these requirements.

The plan called for the implementation of the TRACE system in three stages, with SAGE entirely replaced by TRACE by FY 1967:

1. Ten SAGE direction centers and one SAGE computer (Richards-Gebaur AFB) and the three manual/remote combat centers would be deleted by the end of FY 1964.

2. Six additional SAGE direction centers would be deleted in FY 1966 as the first 17 TRACE NCC's phased in.

3. The remaining six SAGE direction centers would be deleted by the end of FY 1967, and the TRACE NCC's would take over as the primary, and only, manned bomber defense control system for NORAD.

Interim TRACE. To economically substitute TRACE for BUIC II, NORAD needed rapid approval of its TRACE proposal so the BUIC II contractor (Burroughs) could be notified before the company was too far along on the BUIC II program. Of prime importance was notifying the contractor before he began modifying the fixed BUIC II sites and installing equipment into them.

When it became obvious that quick approval would not be forthcoming, partly because of delay caused by a Department of Defense study of the over-all continental air defense system, NORAD made an interim proposal. This provided for the placing of the BUIC II equipment into the transportable TRACE vans instead of into the fixed sites. This, essentially, was TRACE without the added capability needed by TRACE and without the switched communications. The BUIC III system would not be transportable because of the lack of communications, but the equipment could be placed

in the vans for about the same amount of money it would cost to place them in the fixed sites, and the BUIC III system could easily be worked into the TRACE system. This proposal was also awaiting a decision.

BUIC/TRACE COMMUNICATIONS

In January 1962, the Western Electric Air Defense Engineering Service (WE ADES) proposed an automatic switched communications system for all SAGE backup. The possibility of obtaining greater communications flexibility, essentially within current leased communications budgets, prompted NORAD to investigate the proposal further.

The increasing sophistication of weapons, weapons control, and surveillance systems required a communications network of greater reliability, flexibility, and survivability than was afforded by the existing point-to-point system. Through relatively inexpensive modifications to the commercial system, alternate routes providing automatic rapid reconnecting of interrupted calls could be provided to the air defense system in all its modes.

About 70 switching centers would be established throughout the U.S. and Canada, connecting all air defense elements with NORAD Control Centers and SAGE Direction Centers. Each major air defense element would have access to at least two switching points, and each switching point would have trunk connections to at least two other switching points.

The system would use the flexibility and redundancy inherent in the automatically switched network to increase the number of communications channels that could be expected to survive an attack. This survivability would be enhanced by locating the switching centers outside large areas.

NORAD eventually accepted an American Telephone and Telegraph Company proposal for a switched

communications system, and passed the plan on to the JCS for approval.

Later in 1962, NORAD took another look at the suggested switching complex and decided that 70 switching centers would not be nearly enough to attain the desired survivability. NORAD's reasoning was this: Within a given TRACE radar complex (subsector), two TRACE NCC's would each be able to relocate at random to one of three sites, giving a total of six possible locations for the two NCC's. Thus, it would take at least six ICBM's to achieve a high probability of destroying a subsector's control capability. Since the NCC's depended on the switching centers, however, and since there were only about four switching centers to a subsector, the NCC's in a subsector could be neutralized by planting four ICBM's on the fixed switching centers. There was no point in making the NCC's more survivable than the communications they depended on, so NORAD suggested that at least as many fixed switching centers be provided as there were possible NCC locations (or 114, assuming each of the 38 TRACE NCC's had three possible locations).

The added cost for these extra switching centers would have been prohibitive were their use to be limited to the air defense system. NORAD, therefore, in making the requirement, suggested that the capability of the switching centers be broadened and that they be used as a survivable nation-wide communications system used not only by the air defense system but by other military commands and civilian agencies as well, particularly SAC and FAA. Little had been accomplished in this direction by the end of 1962.

Initially, NORAD had advised the RCAF to hold off on a study applying the switching proposal to the Canadian part of the system until NORAD had had a chance to study the AT&T proposal. When NORAD accepted the proposal, it recommended that the Canadian study proceed. Canada was electing to

delay its study, however, until the U.S.'s future course of action became more discernible.

COMMUNICATIONS

COMMAND AND CONTROL TELECOMMUNICATIONS REQUIREMENTS

NORAD submitted to the JCS on 22 May 1962 four requirements to meet its near-future needs with off-the-shelf items in the general areas of increasing the survivability and reliability of NORAD communications. The requirements and their status as of the end of 1962 were as follows:

a. A NORAD ALCOP By-pass Route. NORAD asked that its ALCOP be tied into the Kansas City by-pass route at LaCygne, Missouri, by placing a micro-wave link between Richards-Gebaur AFB and LaCygne. The request was approved by the JCS and sent on to the DCA for action. The DCA pointed out that USAF had taken steps in February 1962 to install a commercial radio system between the two points to meet the requirements. The system was operational by mid-August 1962.

b. An Automatic Ballistic Missile Attack Warning System. NORAD asked for a system automatically activated by alarms from BMEWS, Bomb Alarm, NUDET, and MIDAS to provide warning of a ballistic missile attack from the NORAD COC to all subordinate units down to the lowest combat element. The request was approved by the JCS and forwarded to the DCA for system planning.

c. Diversity routing for the NORAD environment. NORAD asked for at least two geographically separated routes for voice, data and teletype between NORAD and its ALCOP, NORAD and its regions, NORAD and the region ALCOP's, the NORAD ALCOP and regions and region ALCOP's and NORAD and the JCS, SAC, and RCAF. Approved by the JCS, the request was passed on to the DCA for system planning.

d. A status indication and automatic transfer capability for NORAD circuits. NORAD asked for a modification of the existing voice circuits from the COC and the ALCOP to all regions and region ALCOP's to permit the automatic transfer of the circuits from an inoperative COC to the ALCOP, and from region combat centers to region ALCOP's should the combat centers become inoperative. The JCS approved the request and passed it on to the DCA.

NORAD/DCA RELATIONSHIP

NORAD became increasingly concerned during 1962 with the range of communications control of the relatively new Defense Communications Agency (DCA). The JCS recognized that a commander, even when served by a consolidated communications system, must have control of the communications provided him. Implementing directives and activation plans, however, did not provide CINCNORAD with the assurance that he would control channels allotted him by the DCA in the Defense Communications System (DCS). CINCNORAD was concerned particularly with:

a. The BMEWS Rearward Communications System;

b. The NORAD/ADC Tactical Telephone Network;

c. The NORAD/ADC Command and Control Teletype Network;

d. The external communications for the NORAD underground COC.

All of these systems had been designated as part of the DCS.

In answering a JCS request for comment on an OSD draft of DOD communications policies, NORAD

said it recognized and appreciated the advantages that were expected to result from the DCS, including increased survivability, greater network flexibility, and improved technical and funding support. But NORAD was concerned over the conflict that could develop during a national emergency in establishing priorities for restoring circuits.

NORAD was also concerned with how responsive a large centralized authority, such as the DCA, could be during a national emergency. Commercial contractors were generally responsive most quickly and fully to the agency that paid them. The higher the paying agency was in the chain of command, the longer it would take commands such as NORAD to get them to respond because of the middlemen involved. NORAD felt that in a national emergency this could lead to unacceptable delays.

Also, there seemed to be some ambiguity in the DOD policy on the matter. Unified and specified commands were to exercise control over tactical circuits, but the DCA would control long-line, point-to-point circuits. The question sometimes was, which were tactical and which were not? NORAD considered many of its circuits tactical even though they were long-line and point-to-point. At the end of the year, the DCA seemed to be winning out fairly consistently on these differences of opinion. NORAD suggested that the boundary between tactical and other systems be more clearly defined, and that unified and specified commanders be given a measure of control over their own portions of the DCS.

NORAD VOICE SECURITY COMMUNICATIONS PLAN

On 12 September, the JCS asked NORAD to prepare a five-year voice ciphony plan. The plan was to include connections between NORAD Headquarters and points in Canada and the U.S. vital to the NORAD system. Unilateral and internal component command planning for secure voice equipment was to be a responsibility of the component commander.

Since the telephone was the most rapid means of communicating, NORAD said it felt it needed a reliable, high-quality, instantly responding secure voice system. CINCNORAD had to be able to communicate by secure voice circuits with the JCS, the COSC, and their alternate command posts; NORAD also had to be able to reach other unified and specified commands, NORAD regions and sectors, and specified BMEWS and SPADATS sensor sites. These circuits had to be secure because the enemy presently could intercept NORAD voice communications on most of NORAD's existing circuits.

NORAD's plan, to be submitted early in March 1963, called for:

a. A device to indicate whenever a security mismatch occurred, such as a line cleared for top secret being connected to one cleared for secret;

b. Different levels of priority;

c. A conferencing capability at the COC;

d. An automatic switchboard;

e. Automatic resynchronization;

f. Full-duplex voice;

g. On-line voice encryption up to and including top secret;

h. An automatic switching capability for the NORAD command and control voice communications network by November 1963.

CHAPTER 7

WEAPONS

MANNED BOMBER WEAPONS SYSTEMS

INTERCEPTOR FORCE

Regular Force. The NORAD regular interceptor force increased to 49 squadrons in October with the assignment of a Navy F4B squadron of 12 aircraft (VF-41) to Key West, Florida. However, the assigned aircraft strength was down from 1,007 aircraft at mid-1962 to 978 at the end of the year. For changes occurring after the first of the year in the Florida-based forces, see Chapter One, page 6.

During the last six months of 1962, the last of the five Canadian CF-101 squadrons completed conversion training. The Canadian squadrons were deployed at five separate permanent bases, as scheduled.

Augmentation. The ADC Air National Guard force, which provided Category I augmentation for the NORAD forces, rose temporarily to 26 squadrons from a mid-year total of 23 squadrons then dropped to 25 squadrons. In August, three F-104 squadrons, the 151st FIS, McGhee-Tyson, Tenn.; the 157th FIS, McEntire ANGB, S. C.; and the 197th FIS, Sky Harbour, Ariz., returned from active duty and were assigned to NORAD. However, in October, the 197th changed its mission to air transport, leaving 25 Category I squadrons in NORAD.

The Canadian Navy squadron was dropped from NORAD's Category II augmentation forces when it was disbanded on 7 September 1962. Still remaining in Category II were interceptors from regular force units from TAC, USAF ADC, RCAF ADC, and USN/USMC.

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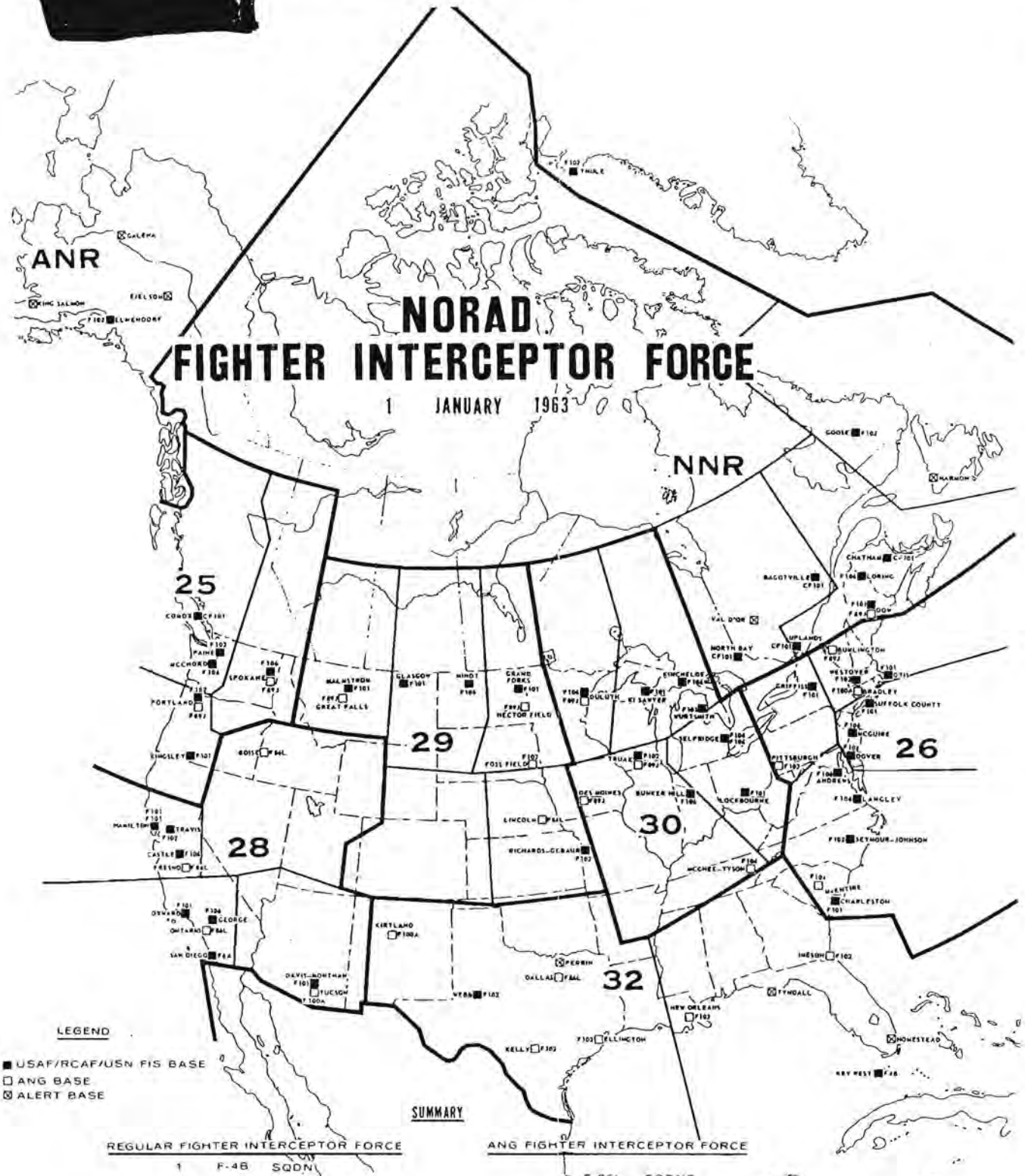
[redacted]

NORAD FIGHTER INTERCEPTOR FORCE

1 JANUARY 1963



LEGEND

■ USAF/RCAF/USN FIS BASE
□ ANG BASE
⊠ ALERT BASE

SUMMARY

REGULAR FIGHTER INTERCEPTOR FORCE		
1	F-4B	SQDN
1	F-6A	SQDN
5	CF-101	SQDNS
17	F-101	SQDNS
11	F-102	SQDNS
14	F-106	SQDNS
TOTAL 49		SQDNS

ANG FIGHTER INTERCEPTOR FORCE		
5	F-86L	SQDNS
9	F-89J	SQDNS
3	F-100A	SQDNS
6	F-102	SQDNS
2	F-104	SQDNS
TOTAL 25		SQDNS

[redacted]

[redacted]

NORAD no longer had a Category III augmentation force. In September, the Naval Reserve units were deleted from NORAD's inventory, followed by all TAC/ANG interceptor units in November.

BOMARC FORCE

The ten-squadron BOMARC program was completed when the second Canadian squadron, 447 SAM Squadron, LaMacaza, Quebec, became operational on 1 December 1962. Two squadrons had A missiles, five had B missiles, and three had a mixture of A and B missiles. The assigned missile strength was 461 -- 209 A and 252 B missiles.

NIKE FORCE

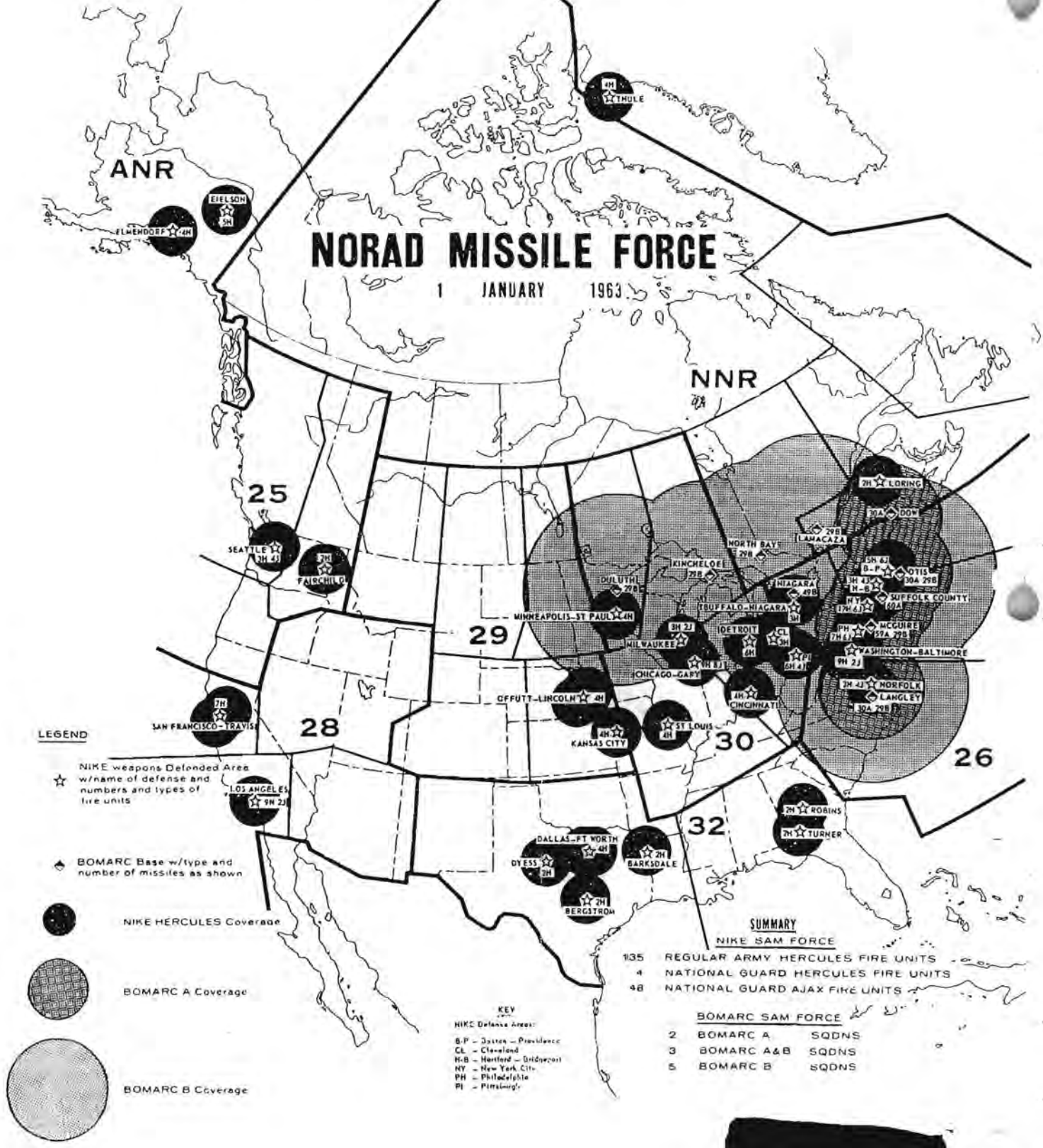
Army National Guard. The ARNG Nike Ajax fire units were to be phased out entirely. Forty-eight of the 139 RA Nike Hercules fire units were to be transferred to the ARNG. The phase-out of the Ajax fire units began in May 1962 and was to be completed in FY 1964. At the end of 1962, 48 ARNG Ajax units remained in the NORAD inventory. On 11 December, the first four RA Hercules fire units were turned over to the ARNG, leaving 135 Hercules fire units in the RA under the operational control of NORAD.

Hercules Improvement Program. The major items being added to the system under this program were a HIPAR (High Powered Acquisition Radar) and an ECCM improvement kit for the TTR (Target Tracking Radar). The HIPAR provided much greater power output than previous acquisition radars, increasing range and "burn through" capability in a heavy ECM environment. Also, the HIPAR contained ECCM features which were an integral part of the set. Of a programmed 66 HIPAR's, 32 had been installed at the end of 1962. Those Hercules units not receiving HIPAR were to get ABAR (Alternate Battery Acquisition Radar). These were FPS-36 radars modified with ECCM equipment and redesignated FPS-71.

[redacted]

NORAD MISSILE FORCE

1 JANUARY 1963



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The ECCM improvement kits for the TTR's were being installed in all Hercules fire units in NORAD. At the end of the year, 84 kits had been installed.

Hercules in SLBM Defense. As a means of combating the submarine-launched ballistic missile threat, NORAD recommended modifying the Nike Hercules system to provide a limited capability against short-range ballistic missiles. The Army already had a program to provide an anti-missile capability for Hercules units in its field forces in Europe and the Pacific. The result was that a program was approved and funded by the Army to modify seven Hercules sites in NORAD: two in New York, and one each in Washington, D. C., Boston, Hartford, Norfolk, and Seattle.

Prototype equipment installation was completed at White Sands in October 1962. Formal service test of the equipment was scheduled for February to August 1963. Modifications to on-site equipment was to be initiated prior to completion of the service test to provide an early anti-missile capability.

The anti-missile capability would allow these sites to defend an area of approximately 25 nautical mile radius against a missile with a range of 175 miles. The defended area would be reduced to about a seven nautical mile radius against a missile with a 350-nm range.

INTERCEPTOR DISPERSAL PLAN

The JCS directed NORAD in June 1961 to develop plans for increasing the survivability of the air defense system against a ballistic missile and follow-on bomber attack. The plans were to include provision for interceptor dispersal.

Based on NORAD's requirements, USAF ADC prepared a plan for interceptor dispersal, "Air Defense Command Operation Plan 20-62, Fighter

Dispersal/Increased Alert," issued 1 May 1962.* The initial operational objective of the plan was to maintain an increased alert status and develop an all-weather capability to disperse one-third of the interceptors located in vulnerable target areas. Priority was to be given to those squadrons collocated with SAC retaliatory forces and SAGE.** Upon tactical warning of an ICBM attack, one-third of the interceptors would be flushed and recovered at either home or dispersal bases. If strategic warning (12 hours) was received, provision was made for dispersal of an additional one-third of the designated interceptor force. At the dispersal bases, personnel and materiel were to be prepositioned and facilities constructed. The final objective of the plan was to have four to six aircraft (based on 18 or 24 UE) on 15-minute alert at the dispersal bases with an eight-sortie nuclear capability.

On 30 October 1962, USAF relayed to ADC the DOD decision on interceptor dispersal. USAF said that the ADC dispersal program was approved subject to certain modifications. Permanent dispersal was not approved; instead, dispersal bases with support for two sorties per dispersed aircraft should be established. However, as a result of an ADC appeal to USAF later, ADC's plan for permanent dispersal was finally approved.

In the meantime, USAF had allocated $1.2 million for an interim dispersal program. This called for a 24-hour capability for recovery, turnaround, and relaunch at selected dispersal bases for all interceptor squadrons collocated on SAC bases.

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* For dispersal in the Cuban crisis, see Chapter One.

** Of the current 39 bases in CONUS occupied by ADC interceptors, 25 were collocated with SAC and six with SAGE.

By the end of 1962, some 25 squadrons had achieved a turnaround capability at 15 designated Air Force bases. Negotiations were in progress to use selected U.S. Navy and Canadian bases for dispersal. Also, a few squadrons had achieved a capability of having aircraft on 15-minute alert at dispersal bases with a limited sortie capability.

INTERCEPTOR FOR CONTINENTAL AIR DEFENSE

Background. The F-108 program was cancelled back in September 1959. However, USAF continued development of the ASG-18 fire control system and the GAR-9 air-to-air missile intended for this aircraft. Twenty-four million dollars was being spent on R&D for these two systems for FY 1963. Prior to this, $40.5 million had been provided.

NORAD's current objectives plan, NADOP 64-73 issued on 1 March 1962, called for two new interceptors. The first was an Improved Manned Interceptor (IMI), needed to compensate for the attrition and obsolescence of current USAF interceptors. The IMI was to incorporate the maximum state-of-the-art available in the 1966 time period. It was to be a Mach 3, 1,000-mile radius-of-action interceptor and have a capability beyond the ASG-18 fire control system. The plan envisaged 12 squadrons by 1968 (UE of 18 aircraft). NORAD reaffirmed this requirement to the JCS in April 1962 in response to a DOD directive to prepare plans to strengthen northern perimeter defenses.*

The second long range interceptor NORAD wanted was called the Advanced Manned Interceptor (AMI). This aircraft was to have the capability to operate with a lesser degree of close control, employ a 500-mile weapon, and have a speed of Mach

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* See NORAD/CONAD Historical Summary, Jan-Jun 1962, pp. 68 and 69.

3 with a dash capability of Mach 4.5. Air Force Systems Command had let a study contract in August to compare the effectiveness and survivability of the AMI, IMI, and EAGLE-AERIE systems. Selected contractors were North American Aviation and General Dynamics Corporation. The study was to be completed in the first half of CY 1963.

Current Status of IMI. USAF and ADC had each prepared independent studies comparing the IMI with the A-3J, F-110, and TF-X (F-111). Both these studies, the USAF Interceptor Comparison Study and the ADC Operational Effectiveness Study, concluded that the IMI had significant advantage over other possible choices in the 1966-70 time period. The USAF Interceptor Comparison Study was forwarded to DOD on 29 June with the recommendation that the Secretary of Defense concur in the requirement for an IMI and authorize USAF to submit a development plan for this weapon system. NORAD submitted the ADC Operational Effectiveness Study to the JCS on 7 August, concurring in its conclusions and indorsing USAF's request to the Secretary of Defense to submit a development plan for the IMI.

As a result, the Secretary of the Air Force forwarded a proposed program to OSD on 7 November. The program called for deployment of the first operational squadron of 18 aircraft in FY 1967 and 12 squadrons of 216 aircraft by the end of FY 1969.

Previous to this, on 16 August, the Secretary of Defense had asked NORAD to prepare a manned interceptor program for continental air defense, including the IMI. Among other things, NORAD was to make a comparison study of the presently approved interceptor program against the proposed program with the IMI. In a follow-up memorandum of 22 August, the Secretary asked what reductions in radars and dollar savings could be made if the IMI entered the inventory.

NORAD completed the study and forwarded it to the Secretary on 17 September. As of the end of

the year no decision had been made on a new manned interceptor for air defense.

BALLISTIC MISSILE AND SPACE WEAPONS DEFENSE SYSTEMS

NIKE ZEUS

As matters stood at the end of 1962, the requirement for an active AICBM system continued to occupy first priority in NORAD's objective plans. NADOP 64-73 called for two Zeus defense centers and eight fire units at four firing sites by FY 1967, and 31 centers and 75 fire units at 55 firing sites by 1970.

However, the Nike Zeus program continued in the R&D stage. The FY 1963 Army budget provided $280 million for continued research and testing. These funds included provision for development of a prototype ZMAR (Zeus Multi-purpose Array Radar), and funds to initiate R&D on SPRINT (a high performance quick reacting missile).

In September, NORAD learned that the Army had issued contract awards of $375,000 each to Douglas, Lockheed, Martin, and North American Aviation for a study to define a SPRINT AICBM missile development program. The study was to be completed in 120 days. The requirements were for ICBM destruction up to 108,000 feet, with engagement time of 10.5 seconds, to include system reaction time after a decision was generated, and 4.5 seconds to 20,000 feet. A 48-missile complex was to be considered with a capability of launching 12 missiles simultaneously every ten seconds. If possible, the missile was not to exceed 150 G axial acceleration. SPRINT was to protect sites hardened to 100 psi. For urban application, 15 psi at ground zero was the maximum acceptable level.

OSD asked the JCS to comment on a proposal to cancel further development of the basic Nike Zeus

system and proceed with R&D of ZMAR and SPRINT. On 7 November, the JCS unanimously rejected the proposal, but submitted a split paper on Zeus deployment. The Army and Navy recommended Zeus production in FY 1964 with first deployment in FY 1967. They also recommended continued development and test of the basic Zeus system during production lead-time and R&D of ZMAR/SPRINT at high level for both urban and hard point defense purposes. While USAF went along with the Army and Navy for continuing R&D, it recommended deferring deployment until more evidence of Zeus capability was obtained through testing.

INTERIM SATELLITE INTERCEPT CAPABILITY

The Secretary of Defense approved an Army recommendation to develop an interim satellite intercept capability by modifying the Zeus Kwajalein facility. The proposed system was to have intercept capability for satellites up to an altitude of 200 nautical miles. DOD had released $15 million from emergency FY 1962-63 funds and directed the Army to prepare for a demonstration by 1 May 1963.

MANNED MANEUVERABLE AEROSPACE DEFENSE SYSTEM

NORAD had stated a requirement in NADOP 64-73 for a defense weapon system to counter space vehicles up to an altitude of 20,000 miles. In June, NORAD recommended to the JCS that the DYNASOAR Program be broadened to include a study of this requirement. The JCS replied on 12 September that NORAD's views had been referred to Chief of Staff, USAF, to assist in defining the scope of the DYNASOAR program.

CHAPTER 8

OPERATIONS AND PROCEDURES

EXERCISE SKY SHIELD III

DESCRIPTION OF THE EXERCISE

As in the first two Sky Shield exercises (September 1960 and October 1961), the main purpose of Sky Shield III was to exercise and train the entire NORAD complex in a realistic ECM environment. Once again, this involved grounding commercial, private, and non-participating military aircraft in the U.S. and Canada to clear the airspace -- a prerequisite to fighting the air battle. In Sky Shield III, the grounding period was five and one-half hours, from 1900Z on 2 September to 0030Z on 3 September.

Grounding Results. When the period began, there were still 25 aircraft airborne in the U.S. and 7 in Canada. These were, for the most part, slightly delayed aircraft outbound from the continent or light aircraft which either failed to get the information or ignored it. In any event, they were either on the ground or clear of continental airspace very quickly and in no way interfered with the exercise.

During the exercise there were 69 emergency flights -- 61 in the U.S. and eight in Canada. These consisted principally of forest fire flights, air-sea rescue and medical evacuation flights. Eighteen authorized, but unscheduled, logistic flights in support of the exercise were flown and safely controlled. Finally, 20 unauthorized flights occurred during the exercise.

SCATER/ESCAT Tests. For the first time in Sky Shield exercises, procedures were tested for

the U.S. SCATER (Security Control of Air Traffic and Electromagnetic Radiations) and the Canadian ESCAT (Emergency Control of Air Traffic). The test was designed to exercise facilities of the Federal Aviation Agency/Department of Transport in clearing the continental airspace of all non-essential traffic prior to an all-out air battle.

For the test, 319 T-33 aircraft were used -- 263 in the U.S. and 56 in Canada. These aircraft took off from random locations throughout the U.S. and Canada and were airborne at the beginning of the grounding period. In effect, they simulated civilian air traffic which would have to be grounded when SCATER/ESCAT was put into effect by NORAD.

SCATER/ESCAT was implemented at 1905Z. All the T-33 test aircraft were on the ground by 1954Z in Canada and by 2017Z in the U.S. The mean time for clearing the airspace was 29 minutes in Canada and 23 minutes in the U.S.

The Strike Force. The strike force was made up of aircraft from SAC, the principal contributor, USN/USMC, RCAF ADC, and USAF ADC. The number planned, 588 aircraft, was smaller than for the previous Sky Shield but far more concentrated in time and space. There were 536 strikes actually flown or 91% of those scheduled. Altogether, the strike force produced 906 Fakers.

Well before the grounding period and recovery of the SCATER/ESCAT test force, the first strike aircraft made the first penetration. At 1626Z, a SAC B-52, staging out of Guam penetrated the Pacific Barrier about half-way between Midway and the Aleutians. During the exercise, there were a total 24 actual penetrations of the early warning lines along with simulated ECM at various points to account for the large number of aircraft which later penetrated contiguous radar cover.

NORAD Forces. When the first penetration occurred, a report was flashed down the chain to Midway

then to Barbers Point, Hawaii, and then direct to the NORAD Combat Operations Center. In less than 15 minutes, the first penetration was on the ICONORAMA Display directly in front of CINCNORAD and his battle staff. The NORAD forces were then brought to the maximum state of alert and remained there for the next eight hours.

In the ground environment, there were 182 prime radars and 102 gap fillers available and operating. NORAD had 945 fighter interceptors on alert at the beginning of the exercise, along with 226 ADA fire units with 1782 missiles (1134 Hercules and 648 Ajax). There were also nine BOMARC squadrons with 347 missiles available.

RESULTS OF THE EXERCISE

As planned, the NORAD air defense system was trained and exercised as an entity in a realistic environment approaching wartime conditions. Communication systems received a thorough workout. Sky Shield III afforded extensive interaction between Headquarters NORAD and the regions and the opportunity to exchange operational information between NORAD, SAC, the JCS and COSC. A portion of Sky Shield III also served as an operational evaluation for Northern NORAD Region. However, this region's ability to counter the threat was not rated because of severe restrictions imposed on intercepts against SAC aircraft.

In interceptor training, there were 481 attempted engagements, with 357 targets engaged out of 1156 sorties flown. This effort resulted in 334 missions accomplished, with 258 simulated kills.

These results were disappointing to NORAD. The low success rate was attributed to the rigid and unduly restrictive rules of engagement which prevented fighter interceptors from making effective and realistic engagements against the Faker force.

In BOMARC training, there were 185 simulated firings, with 109 missions accomplished and 85 simulated kills.

Nike Hercules fire units had 428 simulated firings, with 387 missions accomplished and 311 simulated kills. Ajax fire units had 65 simulated firings, 54 missions accomplished and 21 simulated kills.

Finally, Sky Shield III provided the ground environment with beneficial surveillance training in ECM conditions, particularly in the use of ECCM fixes. Generally, the use of available ECCM devices and techniques served to minimize the effects of ECM and enabled commanders to see through it and conduct the air battle. However, the ECM experienced in Sky Shield III varied throughout the system -- some regions received a fair amount while others got virtually none. The general consensus among the region commanders was that the ECM provided by SAC during the exercise was ineffective. NORAD saw no hope for improvement in ECM in future Sky Shield exercises until the program for externally-mounted ECM pods for air defense aircraft was fulfilled.*

REGIONAL AND SYNTHETIC EXERCISES

EXERCISE DOUBLE EAGLE

On 19 July 1962, SAC conducted exercise "Double Eagle" against the 28th NORAD Region. The simulated air attack was designed by SAC to evaluate certain penetration tactics, but NORAD used the exercise for training and as a vehicle for reaching general conclusions on NORAD's ability to counter a realistic air attack.

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* See NORAD/CONAD Historical Summary Jan-Jun 1962, pp. 77-79.

SAC's attacking force consisted of 77 aircraft including B-58's, B-52's, B-47's, and E-47's, employing maximum ECM as a penetration aid.

One of the conclusions of the exercise was that: "Although the electronic jamming activity on this exercise did not saturate the entire Region's air defense system, there were a number of individual jamming conditions where radar systems with ECCM fixes were unable to provide adequate detection and tracking capability. This situation, plus the fact that the ECM employed during the exercise was short of the estimated Soviet ECM capability, points to the need for greater emphasis on the requirement for an automatic passive detection and tracking system in NORAD."

EXERCISE DESK TOP V

General. NORAD had a continuing requirement for exercising the command, control, warning and communications system in order to maintain an integrated and effective aerospace defense force. Designed for this purpose was the "Desk Top" series of NORAD-wide synthetic command post exercises. Currently, Desk Top V was being conducted in four parts during FY 1963 -- the first part was run on 21 August 1962.

Desk Top V developed a two-wave hostile air situation over the North American continent as anticipated by NORAD on the basis of its current intelligence estimates. These situations included ICBM, SLBM, ASM, ECM, and manned-bomber attacks and were accomplished through the media of filmed, taped and scripted inputs. The resulting air defense operations were conducted by simulated means using controllable synthetic video on radar scopes. The pre-battle intelligence buildup and the exercise air picture acted primarily as background and motivation for NORAD battle and support staff and unit command post actions.

Evaluation of the COC. During Desk Top V, an operational evaluation of the Combat Operations Center was conducted. The purpose was to determine if the COC facility adequately fulfilled the needs of CINCNORAD. Considered within the scope of the COC facility were the Battle Staff, the CRC and the COC proper -- including BMEWS and SPADATS facilities.

This was the first time an attempt had been made to incorporate realistic SPADATS information into an exercise. The exercise pointed up the fact that SPADATS was not entirely integrated into the COC and that positive control of the system was exercised by the component command through the 1st Aerospace Squadron and not by NORAD.

The following were the general observations recorded in the Operational Evaluation Report:

"a. The COC, specifically the Iconorama System, is not capable of adequately displaying in an acceptable and readable manner all of the information presently programmed into the Iconorama System.

"b. The CRC, as presently organized, manned and equipped (particularly external communications) is not capable of providing the prebattle and battle phase information requested and/or required by the Battle Staff."

EXERCISE SWIFT KICK

On 2 October 1962, NORAD conducted a "no notice" operational effectiveness check, named Swift Kick 2. The purpose was to test reaction time of the NORAD system to attain maximum combat readiness status. Swift Kick was implemented via the Readiness and Warning Network. Region and sector battle staffs were required to assemble as fast as possible. All units were required to attain Delta status as rapidly as possible and to load and man all weapons.

Following Swift Kick, detailed analysis was undertaken to determine reaction time of the various parts of the system. For example, region battle staffs averaged ten minutes to assemble. It took an average of two hours and 24 minutes for regions to attain a Delta status, and one hour and 54 minutes for sectors. Fighter-interceptor squadrons averaged one hour and thirty minutes. In the same length of time, nearly all of Nike fire units had attained Delta status. Within 30 minutes, 304 BOMARC missiles were on Delta status.

IMPACT OF CUBAN SITUATION ON TRAINING

When the NORAD forces assumed increased alert status in October as a result of the Cuban situation, NORAD notified the regions that training requirements set out in NORADR 51-4 were suspended. Training was left to the discretion of the region commanders. Following the return to normal alert status on 27 November, NORAD told its regions that, except for the Montgomery Sector, effective as soon as possible, but not later than 15 January 1963, training requirements were to be reinstated.

During this crisis period, the impact of increased alert requirements on training varied between regions. In some regions it was estimated that only 16-20 percent of unit training was accomplished, while in others as high as 90 percent of the normal training was achieved.

Also, as a result of the Cuban situation, joint training with SAC was cut out almost entirely for the remainder of the year. Big Blast missions (SAC/NORAD joint ECM/ECCM training) were cancelled through to the end of December. This resulted in a loss of 64 SAC ECM targets in the 25th, 30th and 32nd NORAD regions. The semi-large-scale exercise, Autumn Moon, which was scheduled for December was cancelled and rescheduled for February 1963. Postponement of this exercise meant an additional loss of 130 SAC targets. Finally, the SAC/ARADCOM Radar

Bomb Scoring program, which provided ECCM training for Nike units, was reduced to only token activity.

NORAD ALERTING SYSTEM

To provide NORAD with a faster means of alerting the system in the ICBM era, the existing teletype network, Alert Net Number One, was being replaced with an improved Voice Alerting System. The scheduled operational date for the new system was 7 December 1962.*

As a result of the Cuban crisis in October, however, restrictions on testing the new Voice Alerting System were imposed which shifted the operational date into 1963. Tests were rescheduled for 15 January to 15 February. During the test period, Alert Net Number One was to continue to be the primary warning and alerting system; however, the Voice Alerting System was to be used in exercises.

REGULATION FOR ECM OPERATIONS

On 31 October 1962, NORAD issued a new regulation -- NORADR 55-16, "Procedures and Policy for Processing ECM Clearances." The purpose of this regulation was to standardize the handling of inflight ECM operations throughout NORAD. The issuing office was the Operations Electronic Warfare Division, a new division established in DCS/Operations on 1 January 1962.

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* See NORAD/CONAD Historical Summary, Jan-Jun 1962, pp. 88-89.

** The forerunner to the establishment of this division was the transferring of electronic warfare policy in Headquarters NORAD from DCS/Communications and Electronics to DCS/Operations, on 1 January 1961.

GLOSSARY

GLOSSARY OF ABBREVIATIONS

ABAR	Alternate Battery Acquisition Radar
ADC	Air Defense Command
AEW&C	Airborne Early Warning and Control
AFSC	Air Force Systems Command
AICBM	Anti Intercontinental Ballistic Missile
ALCOP	Alternate Command Post
ALRI	Airborne Long Range Inputs
AMI	Advanced Manned Interceptor
ANG	Air National Guard
ANGB	Air National Guard Base
ANR	Alaskan NORAD Region
ARADCOM	Army Air Defense Command
ARNG	Army National Guard
ASM	Air-to-Surface Missile
B/C	Biological/Chemical
BIRDIE	Battery Integration and Radar Display Equipment
BMEWS	Ballistic Missile Early Warning System
BUIC	Back Up Interceptor Control
CC&DF	Central Computer and Display Facility
C (Charlie)	Weapons Readiness Status
COC	Combat Operations Center
CONAD	Continental Air Defense Command
CONUS	Continental United States
COSC	Chiefs of Staff Committee (Canada)
CRC	Combat Reporting Center
DCA	Defense Communications Agency
DEFCON	Defense Readiness Condition
D (Delta)	Weapons Readiness Status
DEW	Distant Early Warning Line
ECCM	Electronic Counter Countermeasures
ECM	Electronic Countermeasures
ESCAT	Emergency Control of Air Traffic
ESD	Electronic Systems Division

FIS	Fighter Interceptor Squadron
HIPAR	High-Powered Acquisition Radar
IMI	Improved Manned Interceptor
MCL	Mid-Canada Line
MIDAS	Missile Defense Alarm System
NADOP	North American Air Defense Objectives Plan
NCC	NORAD Control Center
NNR	Northern NORAD Region
NORAD	North American Air Defense Command
NUDET	Nuclear Detonation
PARL	Prince Albert Radar Laboratory
SAGE	Semi-Automatic Ground Environment
SAO	Smithsonian Astrophysical Observatory
SCATER	Security Control of Air Traffic and Electromagnetic Radiations
SLBM	Submarine-Launched Ballistic Missile
SNOCAP	Survivable NORAD Emergency Capabilities
SPADATS	Space Detection and Tracking System
SPASUR	Space Surveillance System (Navy)
SPO	System Project Office
SSB	Single Side-Band
TAC	Tactical Air Command
TRACE	Transportable Automated Control Environment
TT	Texas Tower
UE	Unit Equipment
ZMAR	Zeus Multi-Purpose Array Radar

INDEX

[redacted]

INDEX

[redacted]

Vu 15 Apr 66

[redacted]

[redacted]

[redacted]

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