ADC AND NORAD

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NORTH AMERICAN AIR DEFENSE COMMAND
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UNITED STATES ARMY AIR DEFENSE COMMAND

The inner ring of NORAD defenses--the final perimeter or wall an aerial aggressor must pierce to reach his target--is manned by units of the Army Air Defense Command (ARADCOM).

Air defense is a joint task to which each component of NORAD contributes those forces which it is best suited by experience to train, equip and sustain as an effective element of this single, unified system.

NORAD's component structure is designed to give the continental air defense system true depth. Its defense-in-depth concept combines distance with a variety of weapons. An enemy would be met and engaged along the full range of his attack, by weapons differing according to his distance from the target.

The mission of ARADCOM is to provide combat-ready Army air defense forces to the North American Air Defense Command for air defense of specified critical locations. These forces include surface-to-air missile units deployed in defense of some 18 target complexes from coast to coast in the U. S. They shield more than 100 cities, including many of the nation's heaviest concentrations of population and industry.

(MORE)

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Formed in 1950, within a week after the communist invasion of South Korea, Army Air Defense Command has used missiles since 1953. Today, its troops are armed with the Nike Hercules and the Hawk.

The Hercules, on site since mid-1958, was the first combat-ready surface-to-air missile with nuclear capability to join North America's aerospace defenses and is expected to remain a key weapon in the system for some time. Equipped with their own defense fire distribution systems, the Hercules units can, if necessary, operate independently of the rest of NORAD.

Since the Hercules was first deployed, numerous modifications and additions have been made to the basic system. The improved missile system has increased the capability to engage smaller, swifter targets such as air-to-surface and submarine-launched cruise missiles in addition to the bombers which the Hercules was originally designed to destroy.

The Army National Guard plays an integral role in the ARADCOM task organization, having full responsibility for more than 40 per cent of the more than 110 Nike Hercules sites.

Hawk, the optimum NORAD weapon in use today for interception of low-altitude targets, was moved into southern Florida during the Cuban crisis in October 1962 to bolster defenses against low-level attack and has since become a permanent part of the Army Air Defense Command.

Two electronic systems are in general use in ARADCOM, Missile Mentor and BIRDIE. Key West has the AN/TSQ-38, Battalion Operation Central.

Installed in nine defense areas by January 1967, Missile Mentor replaced six Missile Master systems operational for nearly a decade and selected BIRDIE systems in use for five years.

The new system was developed to meet the increasing need for efficient and economical coordination of air defense weapons which require sophisticated and accurate target information.

Transportability and economy are major advantages of the new system.

BIRDIEs will remain in use in eight of ARADCOM's small to medium-sized defenses.

Hawk missile fire is integrated through ARADCOM's fire distribution system.

The normal mode of operation for ARADCOM units is within the SAGE (Semi-Automatic Ground Environment) system, which gives the NORAD region or division commander control of all defense weapons at his disposal.

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ADC

UNITED STATES AIR FORCE AIR DEFENSE COMMAND

USAF Air Defense Command, which provides more than 70 per cent of the manpower and weapons available to the commander in chief of the North American Air Defense Command, has a working force of almost 100,000 people stationed with over 480 units, and capital assets of nearly $8 billion.

Its mission is to administer, train and equip aerospace defense resources of the U.S. Air Force deployed across the North American continent, except for those in Alaska. It has units throughout the United States and in Canada, Greenland, and Iceland.

It also supervises operation and training of Air National Guard air defense units.

Air Defense Command operations are directed through four numbered air forces and 15 geographical air divisions. Added to these is the 9th Aerospace Defense Division, headquartered at Ent Air Force Base, with the responsibility for the command's space surveillance and tracking operations.

(MORE)

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Under the air divisions are radar or aircraft control and warning squadrons, air defense missile squadrons armed with Bomarc ground-to-air interceptor missiles, and fighter interceptor squadrons equipped with F-101B Voodoos, F-102 Delta Daggers, F-104 Starfighters and F-106 Delta Darts.

The Voodoo and Delta Dart are armed with Falcon missiles and Genie nuclear rockets; the Delta Dagger carries the Falcon; and the Starfighter is equipped with the Sidewinder missile and Vulcan 20-mm cannon.

Extending the land-based radar system seaward are ADC's airborne early warning and control aircraft which fly off the east, west and south shores of the U. S.

Air Defense Command's weapons are controlled by the Semi-Automatic Ground Environment (SAGE) system. Radar data are fed through digital computers which track targets and set up intercept courses. SAGE controls all air defense weapons simultaneously, always subject to human decision.

To give depth to the control system, the Back Up Interceptor Control (BUIC) system has been developed to serve as an alternate for SAGE. This system consists of high-speed, computerized control centers which can furnish air defense commanders with up-to-the-minute information on any airborne threat within their areas of control.

 (MORE)

Air Defense Command operates the two Ballistic Missile Early Warning System (BMEWS) sites at Thule, Greenland, and Clear, Alaska, and shares with the Royal Air Force operation of the third site at Fylingdales Moor, England.

It also contributes to the North American Air Defense Command some of the U.S. portion of the Distant Early Warning (DEW) Line of radars, located generally along the 69th parallel from Cape Lisbourne, Alaska, to Cape Dyer, Baffin Island, with extensions along the Aleutian Islands on the west and across Greenland on the east. The DEW Line was originally built by the United States and was under Air Defense Command from 1957 until, in 1959, Canada assumed control of the four main sites within its territory.

The command provides the Spacetrack system of sensors, a major component of NORAD's Space Detection and Tracking System. This latter, over-all system is responsible for detection, tracking and cataloguing man-made objects in orbit around the earth. Spacetrack collects data from installations all over the world.

Air Defense Command keeps all these systems and forces in a condition of top battle readiness, responsive to the operational requirements of NORAD's commander in chief.

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CANADIAN FORCES AIR DEFENCE COMMAND

Canadian Forces Air Defence Command, with headquarters at North Bay, Ontario, is the Canadian member of the North American Air Defense Command.

Its contributions to continental aerospace defense are in the fields of detection--air as well as space--and interception.

Air Defence Command provided Canada with all-weather interceptor protection beginning in 1954. A more complete protection against aerospace attack on the North American continent came when NORAD was formed in September, 1957.

The NORAD agreement was formally signed on May 12, 1958, on the recommendations of the Canadian Chiefs of Staff Committee and the Joint Chiefs of Staff of the United States. Under this agreement, the air defense forces of Canada and the U.S. work together to formulate and bring into existence an integrated air defense for the continent.

The Canadian Forces Air Defence Command has an extensive detection capability, beginning in the Arctic with the Distant Early Warning Line. The command assumed control from the USAF in 1959 of the four main DEW Line sites in Canada: Cambridge Bay, Cape Parry and Hall Lake in the Northwest Territories, and Cape Dyer on Baffin Island.

(MORE)

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Canadian Forces Air Defence Command mans multi-purpose radar sites in Canada. These radar units provide both a detection and ground control intercept capability and form the northern part of a contiguous radar system covering southern Canada and the U.S. With one exception, data from these stations are processed by the SAGE air defense system.

In 1962, Air Defence Command entered the satellite-tracking field with the installation of a Baker-Nunn camera at Canadian Forces Base Cold Lake, Alberta. This facility tracks objects in orbit and reports results to NORAD's Space Defense System.

ADC operates the aerospace defense command post at North Bay, Ontario. Headquarters for Northern NORAD Region and the 41st NORAD Division, it is a hardened underground center in the SAGE air-surveillance and weapons-control system.

For interception functions, ADC has both interceptor aircraft and Bomarc surface-to-air missiles. A squadron of supersonic CF-101 Voodoos operates from Comox, British Columbia, another from Bagotville, Quebec, and a third from Chatham, New Brunswick. ADC has one Bomarc squadron at North Bay, Ontario, and a second at LaMacaza, Quebec.

Voodoos and Bomarcs are two of the weapon systems that add the knock-down punch to NORAD's defense-in-depth concept of attacking enemy forces all along the routes to their targets.

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THE BALLISTIC MISSILE EARLY WARNING SYSTEM

Fans, almost a billion dollars worth--and the North American Air Defense Command has been using them to keep the heat off this continent during the sixties.

They are the insurance policy that will pay off in warning time if an enemy ballistic missile attack is launched from the north

This is the Ballistic Missile Early Warning System, or BMEWS for short. It is the checkmate to a sneak attack on this continent. It doesn't prevent the launching of an enemy attack, but it does make it a highly unprofitable venture for any aggressor to undertake.

BMEWS telegraphs the punch of the enemy. A costly mistake in either boxing or international nuclear warfare.

The almost immediate knowledge that a missile attack has been launched enables the North American Air Defense Command (NORAD) to take steps that set into action a retaliatory force that would negate any tactical advantage any aggressor could hope to gain.

With BMEWS at full operational capability, the countries of Canada, the United States and England can breathe a little easier. The knowledge that this system will give ample warning time to launch a retaliatory arsenal of weapons against an aggressor has cut down the probability of attack.

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This warning system, vital to the survival of the populations of the free world, is the creation of military and civilian industry working in concert with a common goal. This was no chicken-and-the-egg mental exercise when concerned with air defense. The threat came first and the countermeasure followed.

The advent of the intercontinental missiles in the mid-fifties was the catalyst that set into motion the joint civilian-military venture that was to result in BMEWS.

There were no real pros and cons involved. We had to have a long-range, ultra-high-speed radar warning system to provide the vital time necessary to take defensive measures in the event of an enemy missile attack over the top of the world.

Three BMEWS sites were planned and built. Site I, at Thule, Greenland, was the first to be completed in October 1960, followed by Site II at Clear, Alaska, in June 1961, and in September 1963 Site III at Fylingdales Moor in Yorkshire, England, went into operation.

It wasn't an inexpensive undertaking. The Thule station cost $425 million; Clear, $350 million; and Fylingdales Moor installation $120 million.

Sites I and II are manned by military men of the U.S. Air Force's Air Defense Command. The Royal Air Force Fighter Command operates the third site.

On the North American continent, the BMEWS operation is the responsibility of the NORAD commander in chief, and in England, the commander in chief of the RAF Fighter Command.

At the U.S. sites, fixed antennas the size of football fields set on edge operate around the clock in never-ending probe of space that an enemy missile must enter to impact on this continent. Four of these steel-webbed behemoths are employed in Greenland, and three at Clear, Alaska. Each of the North American sites has a scanner/tracker to pick up from the detection radars after contact has been established.

At Fylingdales Moor site, there are three scanner/trackers which provide a flexibility not only to detect and track intercontinental ballistic missiles but also the intermediate variety to which Western Europe is exposed.

BMEWS employs standard radar techniques, but the key to their value is the high power levels at which they can operate. Detection up to 3,000 miles and more in space is not beyond their capability. This, teamed with the data gleaned from the reaches of space and automatically processed and sent to the combat operations center in Colorado Springs in micro-seconds, makes this system the bulwark of defense against the inter-continental ballistic missile.

The electronic fans or beams emitted from the North American sites give an over-lapping coverage of the critical areas to the north. Each site sends out narrow fans at two different angles above the earth's surface. These are scanned simultaneously across the face of the huge antenna reflectors by means of high-speed scanning switches, and a massive array of feedhorns, forming two horizontal detection fans, one above the other.

It is the violation of these two fans that enables the BMEWS site to tell air defense leaders where this missile was launched from, where it is going to impact, and when.

The missiles are in free or unpowered flight making the data from BMEWS irrefutable, and the hard-core basis for air defense action at the NORAD combat operations center.

(MORE)

The BMEWS operation has assumed a role in space exploration to supplement its primary missile-warning mission. It has the capability to track all earth orbiting satellites within range of its radars. These vital data are flashed to NORAD's Space Defense Center, also in Colorado Springs.

This intelligence, along with missile tracks, is displayed on electronic maps for use by the NORAD battle staff in place at the combat operations center. This information is simultaneously sent to Strategic Air Command--the retaliatory force--and to the Pentagon.

Other agencies on the receiving end of the BMEWS data are the National Defence Headquarters in Ottawa, Canada; the RAF Fighter Command's control center at Stanmore, England; and the Supreme Headquarters, Allied Powers in Europe.

The flow of information from the BMEWS sites to NORAD never stops; to make sure it doesn't, the communications data links developed for the system are the most reliable in the world.

The multiple-channel rearward communications networks flash information automatically from the three long-range detection sites over some 225,000 miles of cables and radio circuits with the speed of light.

Each of the sites is linked to NORAD by a complex of land and undersea telephone cable, microwave radio relay and tropospheric scatter transmission systems

Air Defense experts are quick to point out that the BMEWS operation is not the complete answer to early warning. A valuable and indispensable tool, but not the only indicator in use to protect this continent.

(MORE)

Its end product is correlated and evaluated with all other available data, including intelligence gathered throughout the system, before the NORAD commander in chief can make a decision as to whether an actual attack is in progress.

BMEWS has filled in the gap. It is part of the total free world deterrence emplacements which, by their ability to carry out both warning and strike missions, discourage aggression.

The threat remains, but the odds have lengthened.

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ADDITIONAL DATA

	Site I Thule, Greenland	Site II Clear, Alaska	Site III Fylingdales Moor, England
Cost:	$425 million	$350 million	$120 million
Operational Date:	Oct. 1, 1960	June 30, 1961	Sept. 17, 1963
Location:	600 miles above the Arctic Circle	60 miles southwest of Fairbanks, Alaska, and less than 600 miles from USSR territory	Yorkshire Coast, England Operated by the Royal Air Force Fighter Command with a detachment of ADC's 71st Surveillance Wing present to send data from its radars to NORAD headquarters.

EQUIPMENT:

Scanner/Tracker FPS-49 radars at Thule, Greenland, and Fylingdales Moor, England, and the improved model, the FPS-92 built at Clear, Alaska, have an 84-foot rotating antenna encased in a 140-feet-in-diameter dome of laminated fiberglass sheets. With the three-story building on which it stands, the complete installation is 156 feet high, as tall as a 15-story building.

The giant stationary antennas of the FPS-50 detection radars at Thule and Clear are 400 feet long and 165 feet high.

A transistorized computer at the sites interprets data from the radars and determines positively whether the signals represent missiles. This computer, the Missile Impact Predictor, can compute with lightning speed the launch area of the missiles and their predicted impact area.

A Central Computer and Display Facility in the NORAD command post at Colorado Springs receives warning information--threat summary messages, alarm level, launch and impact messages--from the radar sites. A Display Information Processor evaluates automatically the threat information and displays it instantly on screens.

(MORE)

THE BUILDERS:

Building of BMEWS was supervised by the U.S. Air Force, but also involved the U.S. Army and Navy, the Royal Canadian Air Force, the British Air Ministry and the Royal Air Force, plus an industrial team of 2,900 large and small business firms in the United States and a large number of companies in the United Kingdom.

Radio Corporation of America was prime contractor for the system.

Western Electric Company provided communications from the forward bases to the military commands concerned.

Sylvania Electric furnished the majority of data processing equipment and the necessary programming.

Goodyear Aircraft Company fabricated the scanner/trackers.

General Electric Company designed and built the detection radars.

Electronic Systems Division of the USAF Systems Command managed the development program.

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THE NORAD SPACE DETECTION AND TRACKING SYSTEM

The North American Air Defense Command operates a Space Defense Center and a Space Detection and Tracking System--a network of radar, radio and optical sensors concentrated in the northern hemisphere which supplies the command with information on earth orbiting satellites.

The system is multi-service, composed of U.S. Air Force, U.S. Navy, and Canadian Armed Forces sensors with many civilian scientific agencies contributing data on a cooperative basis.

SPACE DEFENSE CENTER

Focal point of the detection and tracking network is the Space Defense Center, an integral part of NORAD's Combat Operations Center, housed in a steel building inside Cheyenne Mountain near Colorado Springs.

The Space Defense Center serves as the command post from which NORAD carries out operational control of the sensor system; it also is the command control facility for operation and supervision of USAF Air Defense Command's Spacetrack System. ADC's 1st Aerospace Control Squadron provides personnel to NORAD to assist in manning the Space Defense Center.

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A computerized master catalogue of space vehicles--payloads and debris, or space "junk"--is maintained by the center. The center also determines orbits of space objects, keeps a schedule of satellite positions, predicts their future positions, and predicts the time and general location of their re-entry into the earth's atmosphere.

By keeping a count and location of objects in space, NORAD can tell if a new satellite has been launched.

Current orbital elements--the mathematical description of the orbit--are maintained by the center on each observed satellite. These elements are used to calculate a satellite's position at any given time. By comparing each observation with the predicted positions of the catalogued satellites, the center can identify each satellite which has been observed.

This is the basic method by which new satellites are identified.

If an observation cannot be associated with a known satellite, an approximate orbit is determined by orbital analysts at the Space Defense Center. Then look angles are generated for those sensors which require them, the initial orbital elements are refined, and the new object is entered in the center's catalogue.

Even after precise data are established on a satellite's position, surveillance of the object and updating of the information must continue because of factors which alter the orbit. For example, the irregular shape of the earth and the uneven distribution of mass within the earth cause variations in the earth's gravitational field and affect satellite orbits. The moon and the sun also exert gravitational influences on the satellite. It has been shown that the lunar or solar influences can, at times, be so strong that eccentric but stable orbits can be radically changed in an extremely short period of time.

For these reasons, Space Defense Center technicians, with the aid of computers, continuously receive sensor inputs, establish the orbital elements for a satellite, and refine the orbital data.

Space-object identification experts at the center also use computer and hand-processed data to perform their functions of determining the size, shape, motion and orientation of satellites.

More than 12,000 satellite observations made by the sensor network are processed daily by the center. The observations flow into the center's data-processing facility, which is equipped with a digital computer capable of 626,950 additions and subtractions per second, or a total of 199,400 multiplications and 79,680 divisions per second.

SPACE DETECTION AND TRACKING SYSTEM

The Space Detection and Tracking System is made up of:

U.S. Air Force Air Defense Command Spacetrack System

U.S. Naval Space Surveillance System

Ballistic Missile Early Warning System

Canadian Armed Forces Air Defence Command Satellite Tracking Unit

This system operates on a relatively simple principle. The Space Defense Center tells a particular Spacetrack sensor where and when to look for a specific satellite, and then the sensor sends the resulting data back to the center.

There, with the aid of the computer, analysts generate a set of look angles on a daily basis for each sensor site requiring them. Look angles provide time, azimuth, elevation and directional information the sensor can use to focus its narrow beam of radar energy or its optical device on a tiny object hundreds of miles away and moving at high speed.

SPACETRACK

Sensors of the Air Defense Command's Spacetrack System form a detection and tracking network extending from the Pacific across the North American continent to Greenland and Europe.

The Spacetrack System has detection and tracking radars at Shemya, Alaska; Moorestown, New Jersey; and Diyarbakir, Turkey. Also included in the Spacetrack System are optical sensors--the Baker-Nunn cameras at Sand Island, near Johnston Island in the Pacific; Oslo, Norway (under agreement with the University of Oslo) and at Edwards Air Force Base, California.

These telescopic, electronically controlled cameras can photograph light reflected from an object the size of a basketball at 20,000 to 25,000 miles in space.

By identification and correlation of the known star background in the photographs, a satellite's position can be determined with great precision and its orbital elements refined.

Although these cameras are the most sensitive and precise of the satellite-tracking instruments, they are limited in that they can photograph only satellites illuminated by the sun while the instruments themselves are in darkness. Normally they can be used only at dawn and dusk. They must be precisely aimed in order to photograph the desired object, since the cameras have a very narrow field of view.

The Canadian Armed Forces Air Defence Command Satellite Tracking Unit at Cold Lake, Alberta, also uses the Baker-Nunn camera. Twelve additional Baker-Nunns which contribute data to the system are owned and operated by the Smithsonian Astrophysical Observatory.

NAVAL SPACE SURVEILLANCE SYSTEM

One of the chief contributors to the Space Detection and Tracking System is the U.S. Naval Space Surveillance System, which provides an electronic "fence" across the southern United States from California to Georgia.

The system, which has been functioning since 1959, has three powerful transmitter stations (Gila River, Ariz.; Kickapoo Lake, Tex.; and Jordan Lake, Ala.) and six receivers (San Diego, Calif.; Elephant Butte, N.M.; Silver Lake, Miss.; Fort Stewart, Ga.; Red River, Ark.; and Hawkinsville, Ga.)

Here's the way it works:

Each transmitter station sends out a continuous wave of radio energy in a fan-shaped pattern with a very narrow north-south dimension and a very wide east-west dimension. This creates the "fence"--a vertical east-west fan of radio energy extending thousands of miles into space. Any satellite passing through this beam is illuminated by radio energy from the transmitter, and part of the energy is reflected back to the receivers.

The receiver stations measure the reflected satellite signal and send their data via direct communications to the Space Surveillance System Operations Center and headquarters at Dahlgren, Va. There the signals are processed by high speed computers and the position of the satellite is precisely determined.

This information is then transmitted to the NORAD Space Defense Center where it is used, along with information from other sensors, to determine where the satellite has been and where it may be on successive revolutions.

(MORE)

SPACE MISSION OF BMEWS

Intended primarily to warn of missile attack over the top of the world, the huge radars of NORAD's Ballistic Missile Early Warning System also have proved to be an important source of data on orbiting satellites.

The system, which employs both detection and tracking radars, has sites at Thule, Greenland; Clear, Alaska; and Fylingdales Moor in northern England.

About one-fourth of all satellite observations are made and reported to the Space Defense Center by BMEWS.

OTHER CONTRIBUTING SENSORS

Other contributors of data to the Space Defense Center on an as available and/or upon request basis, are the National Aeronautics and Space Administration, U.S. Air Force Systems Command radars on the Eastern and Western Test Ranges, and the U.S. Navy's Pacific Missile Range.

Still other data sources include the U.S. Air Force Satellite Control Facility at Sunnyvale, Calif., and civilian-operated sensors.

SENSOR COVERAGE LIMITATIONS

NORAD's goal is to track all man-made earth-orbiting satellites; however, because of the orbital characteristics of some satellites, a small number may be unobservable for many days.

This is because NORAD's space sensors are located in the northern hemisphere. A satellite with a highly eccentric orbit may, at its farthest point from earth, be thousands of miles away, and at its nearest point, several hundreds, and remain effectively out of observation range if its nearest point lies somewhere in the earth's southern hemisphere.

SUPPORTING MAN IN SPACE

Because of the unique ability of the Space Detection and Tracking System to skin-track (maintain surveillance of space objects not emitting signals) and the special capabilities of its computer programs, NORAD has been asked by the National Aeronautics and Space Administration (NASA) to support the U.S. manned space flight programs.

The computer in the Space Defense Center provides predictions of space traffic our astronauts may encounter and provides the identification of space objects sighted by our astronauts.

The center also predicts the time and place the rockets boosting the manned capsules into space will re-enter the atmosphere.

During past missions, the center has supplied position information on target vehicles used in docking maneuvers by the Gemini spacecraft.

THE FUTURE

To maintain continuous surveillance of an increasingly sophisticated and growing satellite population, new surveillance devices are being developed for the Space Detection and Tracking System.

One of these is a south-looking radar being built at Eglin Air Force Base, Fla., programmed to go into operation in 1968 as an addition to the Spacetrack network.

The new facility is designed to detect, track, identify and catalogue man-made objects orbiting the earth, as well as to detect, track and provide data on ballistic missiles penetrating its detection beams.

Nearly all earth-orbiting objects will pass through the viewing field of the Eglin radar at least twice daily.

The building housing the new radar is a huge structure, 13 stories high and more than a city block long. The facility will use an electronic scanning technique called phased-array--a method of looking at large areas of space without movement of the radar antenna. The multiple transmitters and receivers are computer controlled and the emitted beam can be switched from one pointing angle to another in microseconds. This is in contrast to mechanical trackers which can move their beam of energy only by rotating many tons of antenna.

The installation has its own computer capable of processing and storing detection and tracking data, which will be transmitted automatically to the NORAD Space Defense Center. The computer can also generate its own look angles.

SUMMARY

NORAD, using data from its own sensors--plus data supplied by cooperating sensors--with the application of the latest space detection and tracking techniques, maintains a proven capability to keep an accurate catalogue of space objects.

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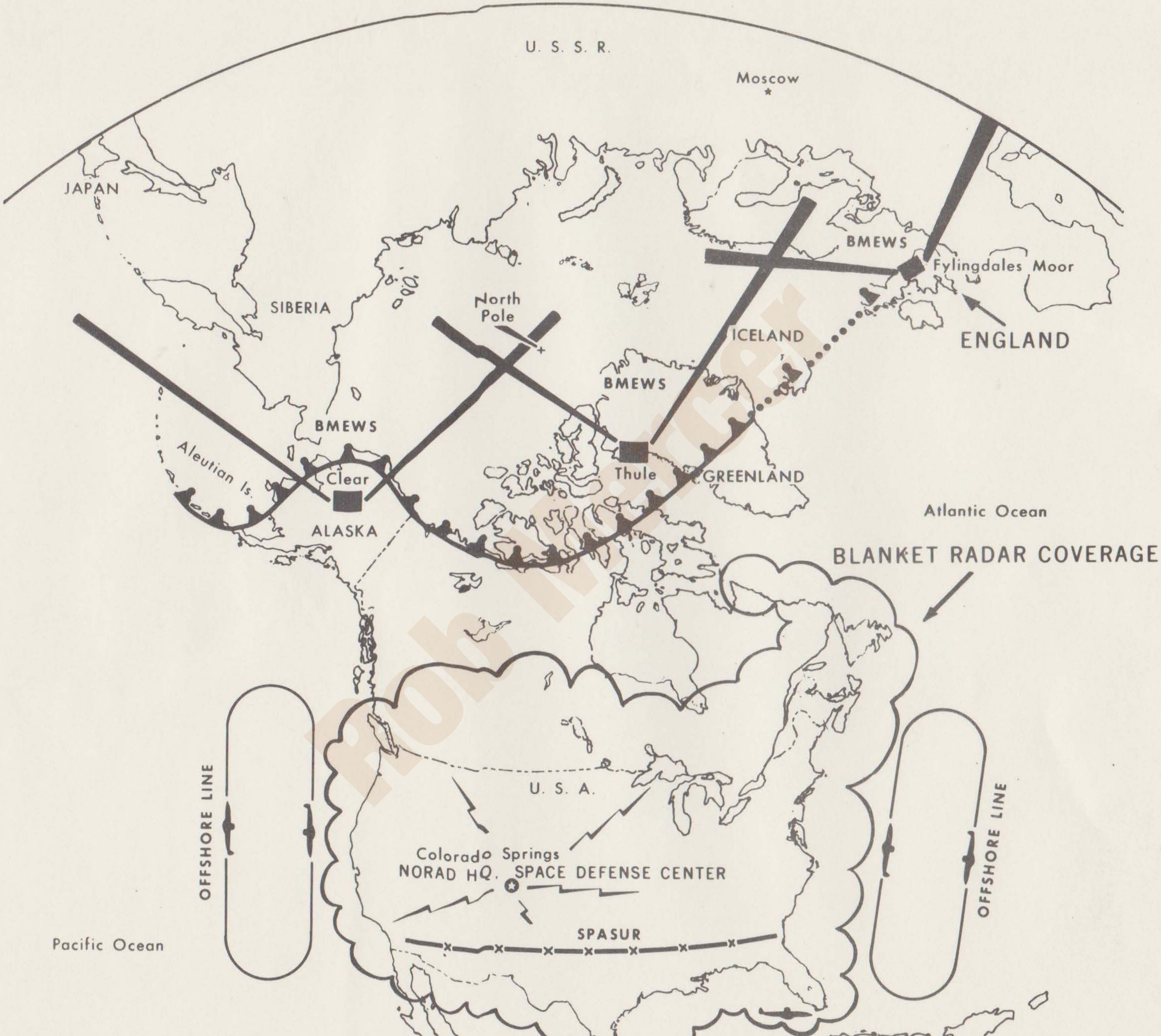
U. S. S. R.
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Aleutian Is.
Clear
ALASKA
Thule
GREENLAND
Atlantic Ocean
BLANKET RADAR COVERAGE
OFFSHORE LINE
OFFSHORE LINE
U. S. A.
Colorado Springs
NORAD HQ.
SPACE DEFENSE CENTER
SPASUR
Pacific Ocean
MEXICO
CUBA

827-65

MEMO FOR THE RECORD

27 Sept. 1967

Subject: Operation of NORAD and ADC Radars

ADC is interested in ayn plane flying over 180 knots. All planes that are going to fly at these speeds should file a flight plan with the FAA or run the risk of being intercepted. All craft must adhere strictly to their flight plan. You must be at your check points at ± 3 min. from that calculated. If you can not make it on time you must call the FAA and notify them they in turn will notify the ADC control center.

Basically ADC is arranged like FAA control centers, each one covers a section of The U. S. These centers have a number of radars spread out around the command post. Inpulses are fed directly to a computer at the center. In this computer too are filed all flight plans from the FAA When a plane is first picked up by the ADC radars a blip appears with some special mark. Say the blip has a triangle around it. The computer keeps this triangle around the blip for 3 strobes then drops the triangle. Whe a control operator sees that there is some point of new info. on the screen he takes an electronic gun of some type and points it at the blip. The computer then reads out on overhead panels all pertinent info. such as flight plan no., speed, direction and height. If the object has a flight plan or is otherwise identified the operator can throw a certain switch and eliminate the blip from the screen. If the object can not be immediately identified the operator has 3 mins. in which to identify it. If at the end of 3 mins. he has not identified it he must call for jet interceptors to be scrambled.

ADC also has ADIZ or Air Defence Identification Zones around the perimeter of the US. These zones are about 20 miles wide and a plane, no matter what speed, must be on IFR, have a flught plan, and call in before crossing it or run the risk of interception.

ADC has in general, three levels at which it moniters:
The low alt. structure which is from 0- 8,000 ft.
The med. alt. structure which is from 8,000- 18,000ft. and
the high alt. structure which is from 18,000 ft. up
Low alt. coverage is not too good. Med. alt. coberage is pretty good and for high alt. we have 100 o/o over the entire US. You can fly visual in the low and med lat. structures, however you must fly IFR in the high alt structure. VFR has the disadvantage of having many more check points. All IFR must have a flight plan and most VFR should have one.

WARNING WEB -- These are the lacings of the electronic network covering aerospace approaches to North America. All are tied to the North American Air Defense Command's underground combat operations center at Colorado Springs, Colo. At three sites near the top of the world, high-powered radar antennas of the Ballistic Missile Early Warning System reach out 3,000 miles to give the alert of an intercontinental ballistic missile attack. Against the manned bomber threat, NORAD employs the Distant Early Warning Line extending across the top of the continent and a system of radars blanketing the populated areas of Canada and the United States. Off both coasts, early warning aircraft extend radar coverage far out to sea. Between Florida and Cuba, other aircraft bolster ground-based radars. Stretched across the southern U.S. is the U.S. Naval Space Surveillance System, one of the satellite detection and tracking nets reporting data on earth-orbiting space objects to NORAD's Space Defense Center.

827-65

3 Sept. 1967

REF: NORAD News Service at Ent ex6017 auto 348-

The detection capabilities and the areas covered by SPADATS and BEMEWS are classified. BEMEWS is not interested unless there are two or more objects and they are to impact on contental US. SPADATS is not interested unless the object is in orbit around the earth.

They are to send some general information on NORAD to us.

NORAD REGULATION NO. 55-14
CONAD REGULATION NO. 55-14

HEADQUARTERS NORTH AMERICAN AIR DEFENSE COMMAND
HEADQUARTERS CONTINENTAL AIR DEFENSE COMMAND
Ent Air Force Base, Colorado
1 December 1966

Operations

★ IDENTIFICATION OF AIR TRAFFIC

PURPOSE. Establishes policies and procedures, designates responsibilities, and outlines the methods and criteria to be employed for the identification of airborne objects within the North American Air Defense (NORAD) and Continental Air Defense (CONAD) system.

1. Scope. Applies to all United States and Canadian military forces assigned, attached, or otherwise made available to the Commander-in-Chief, NORAD, for the performance of his mission. Other commands and agencies having air defense responsibilities to CINCNORAD/CINCONAD will use this regulation for guidance.

2. Concept. The air defense identification process used throughout the NORAD/CONAD system is based on the following two-fold requirement:

a. During normal readiness, to detect and identify any unusual air activity within the perimeter areas of the North American continent which might be prejudicial to the national interests, or indicate an imminent air attack against vital targets in the United States and Canada and to preclude violation of sovereign air space. To meet this requirement, Air Defense Identification Zones have been established around the periphery of the combat zone and the northern extremities of the NORAD/CONAD area of responsibility, and stringent rules have been imposed to facilitate the identification of all air traffic penetrating and/or operating within these zones. Under this concept, unknown aircraft (tracks) will be identified as far from the target areas as is operationally feasible. This emphasis on perimeter identification allows the air defense system to relax the requirement to identify air traffic operating within the interior of the NORAD/CONAD area (defense areas) during periods of normal readiness.

b. During Air Defense Emergency, to establish and maintain the identity and control of, or control over, all airborne objects penetrating or operating within the NORAD/CONAD system. This requirement is met when additional restrictions, as authorized in national plans for security control of air traffic, are applied to the entire NORAD/CONAD area of responsibility.

3. Responsibilities. NORAD/CONAD subordinate commanders will insure that the identification of all airborne objects within their assigned areas of responsibility is carried out in accordance with the provisions of this regulation.

This supersedes NORADR/CONADR 55-14 dated 12 January 1962, as amended.
OPR: NOOP/COOP
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Special Listing - See page 5

★All paragraphs changed.

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Atch 1

4. Explanation of Terms.

a. Identification. The determination of an airborne object's identity by means (or combination of means) of flight plan correlation, visual recognition, track behavior, electronic interrogation, origin and direction, and operating agreements not in conflict with the intent of this regulation.

b. Other terms established for use in this regulation are as prescribed in Attachment 1.

5. Identification Requirements.

a. Tracks (objects) Requiring Identification. All airborne objects, with the exception of those listed in paragraph 7, detected entering or operating within any identification zone in the NORAD/ CONAD area of responsibility, will be identified in accordance with the criteria outlined in this regulation.

b. Time Limits for Identification. The maximum time allowable for initial identification of a track upon penetration or initial detection within an ADIZ is two minutes from the time the track is established by (or received at) the unit responsible for such identification. This time limit may be extended as necessary for the identification of aircraft operating in accordance with certain special agreements approved by NORAD elements of the air defense system.

c. Track Identification. Responsible NORAD/CONAD subordinate commanders will:

(1) Prior to the declaration of Air Defense Emergency, identify tracks as "Friendly," "Unknown," or "Hostile." ("Friendly" tracks may be subsequently classified in accordance with NORADM 55-1.)

(2) Identify tracks as "Friendly," "Unknown," or "Hostile," following the declaration of Air Defense Emergency, but prior to the completion of applicable procedures for the security control of air traffic and air navigation aids.

(3) Identify tracks as "Friendly" or "Hostile" following the declaration of Air Defense Emergency and upon completion of procedures for the security control of air traffic and air navigation aids including the grounding and/or diversion of air traffic as necessary. However, a NORAD/CONAD region commander may, at his discretion, accept an unknown beyond this period, pending further identification action, if the air defense situation in his area is not critical at the time.

6. Identification Criteria.

a. Friendly Tracks. The following methods and criteria are established for the identification of airborne objects as "Friendly." (Tracks with a primary identification of "Friendly" may be subsequently classified in accordance with NORADM 55-1.)

(1) Flight Plan Correlation. The principle NORAD/CONAD method of identification is based on flight plan correlation. Information derived from a flight plan giving details of an intended flight, updated by information obtained from inflight amendments and position reports, is compared with an actual track of an airborne object as obtained by radar or other source. If the information as to the proposed flight, and the information as to the established track, correlate with the following established criteria, the track may be identified "Friendly." The criteria for "Friendly" identification are as follows:

(a) Domestic ADIZ/CADIZ. Correlation within plus or minus five minutes from estimated time over a reporting point or point of penetration, and within ten nautical miles from centerline of intended track over estimated reporting point or point of penetration.

(b) Coastal ADIZ/CADIZ/DEWIZ/DEMIZ. Correlation within plus or minus five minutes from estimated time over a reporting point or point of penetration, and within twenty nautical miles from centerline of intended track over estimated reporting point or point of penetration.

(2) Visual Observations. A track may be identified "Friendly" when positive recognition of the "Friendly" character of the airborne object is reported by one of the following:

(a) Interceptor Pilot. Information obtained from an interceptor pilot in the course of an interception may be used for identification purposes.

(b) Qualified Observer. Information obtained from a qualified observer may be used for identification purposes. (Qualified observers are military or civilian personnel whose duties entail continuous association with air operations.)

(3) Previous Identification. Tracks previously identified "Friendly" and passed by adjacent Air Defense units and which remain under continuous surveillance, will be accepted as "Friendly" unless they create suspicion as outlined in paragraph 6b(2).

(4) Prior Arrangement. A track may be identified "Friendly" if it follows a plan of flight in accordance with a prior arrangement between the NORAD/CONAD commander concerned and the aircraft operator.

(5) Operating Agreements. Local or special arrangements or agreements relative to air defense identification are authorized. Operating agreements not in violation of the intent of this regulation may be established between NORAD/CONAD commanders concerned and other military commands. Agreements with other governmental agencies and/or industrial operators may be consummated in coordination with the ARTCC/ACC concerned.

b. Unknown Tracks. "Unknown" is an initial identification resulting from the inability to identify a track as "Friendly," using the criteria outlined in this regulation. Interception and recognition procedures for unknown tracks will be in accordance with standard tactics prescribed by services and component commands. The following criteria are established for the identification of tracks as "Unknown:"

(1) Any track requiring identification that cannot be identified by ground environment processes within the time limit prescribed in paragraph 5b.

(2) Any track, regardless of its location, creating suspicion as to its friendly intent by reason of course, speed, altitude, radio/telephone procedures, maneuvers, flight size, ECM activity, or other abnormality to an extent that further investigation is deemed advisable.

(3) The ground environment phase of identification will continue after a track is initially identified as "Unknown."

(4) Immediately after a track is identified "Unknown," appropriate action will be initiated to identify the object by visual recognition, through interception, whenever such action is deemed advisable and feasible. Any track identified by intercept, which belongs to a nation possessing a high threat potential, will be immediately reported by voice through normal tactical circuits to the NORAD COC. (Reference Attachment 2.) (NOTE: Intercept action may be delayed and/or withheld on "Unknown" tracks which, in the opinion of the appropriate NORAD/CONAD commander, do not constitute a threat.)

c. Hostile Tracks. Methods and criteria for identification of tracks as "Hostile" will be as prescribed in NORAD Regulation 55-6, Rules of Engagement.

d. Pending Tracks. A track detected outside a perimeter identification zone, on a heading toward the North American continent, may be designated a Pending track. This indicates that identification action will be required if and when the track penetrates the ADIZ boundary or correlation line. Pending tracks will be forward-told to the NORAD COC.

7. Exceptions. Aircraft may be automatically identified as "Friendly" under the following conditions only during conditions of less than Air Defense Emergency. The following exceptions do not preclude further questioning or investigation by the air defense element concerned if circumstances indicate that such action is advisable.

a. Track Behavior. When operating within or penetrating any air defense identification zone north of 28 degrees 00 minutes north latitude or west of 85 degrees 00 minutes west longitude at a true air speed of less than 180 knots.

b. Origin and Direction.

(1) When a track originating within a defense area is identified "Friendly" then penetrates or operates within an identification zone and is under continuous surveillance, the "Friendly" identification can be maintained.

(2) When a track is originated within a defense area or domestic identification zone and maintains an outbound heading into or through a perimeter identification zone, (excluding flights entering the Alaskan Domestic ADIZ from a southerly or easterly direction, e.g., Canada).

c. Free Areas. When originating in and remaining within a free area, as designated by a NORAD/CONAD region commander. NORAD/CONAD commanders may also designate specific areas within their areas of responsibility as temporary "free areas" for special circumstances such as Search and Rescue Operations. Identification within these "free areas" will be established by prior arrangements (reference paragraphs 6a(4) and (5)). Upon declaration of Air Defense Emergency, "free areas" as defined herein will be abolished.

8. Supplementary Identification Methods.

a. Electronic Identification. Electronic identification (IFF/SIF) when used in conjunction with flight plan data on military aircraft operating in conformance with NORAD classified IFF/SIF instructions may be the basis for identification as "Friendly." Civil Air Traffic Control Radar Beacon System (ATCRBS) may be used in conjunction with flight plans, operational procedures, and identifying actions, as specified herein, to assist in identifying "Friendly" from "Unknown" traffic. Prepositioned route data may be substituted for flight plan information when EWOs are being executed. (Reference NORADM 55-4.)

b. Voice Authentication. Voice authentication, using appropriate KAA-29 in conjunction with basic identifying actions, may be used as an additional means of determining the "Friendly" identity of airborne objects.

c. Scope-to-scope correlation of air defense radar plots with positional information obtained from air traffic control facilities on aircraft under air traffic control may be used as an additional method for establishing initial identification or reidentification. This procedure will not apply in periphery areas.

9. Supplementary Instruction. NORAD/CONAD region and component commanders are authorized to supplement this regulation, as required, to establish specific responsibilities and operating procedures for their area.

10. Augmentation Information Folder. A copy of this regulation will be maintained in the Augmentation Information Folder (AIF). Reference NORAD Regulation 55-5, Augmentation Information Folder (AIF).

FOR THE COMMANDER-IN-CHIEF:

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OFFICIAL
CONAD/NORAD

M. M. MAGEE
Major General, USA
Chief of Staff

HENRY P. DAVIS, JR.
Lieutenant Colonel, USAF
Director of Administrative Services

3 Atch
1. Glossary of Terms
2. Interception and Recognition Procedures
3. Violation/Incident Reporting Procedures

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GLOSSARY OF TERMS

The following definitions are established for the purpose of this regulation:

1. Air Defense Identification Zone (ADIZ/CADIZ). Airspace of defined dimensions designated by the Administrator of Federal Aviation Agency (FAA), U. S. and/or Minister Department of Transport (DOT), Canada, within which the ready identification, location, and control of aircraft is required in the interest of national security.

a. Domestic ADIZ/CADIZ. An Identification Zone situated within the continental land mass of the United States, Alaska, or Canada, and territorial waters.

b. Coastal ADIZ/CADIZ. An Identification Zone over the coastal waters adjacent to the United States, or extending seaward from the territorial waters of Canada.

c. DEWIZ. An Identification Zone of defined dimensions extending upwards from the surface, in the vicinity of the DEW Line in Canada, and around the entire coastal area of Alaska.

d. DEMIZ. A military identification zone of defined dimensions extending upwards from the surface, in the vicinity of DEW East in Greenland.

2. Aircraft Movements Information Section (AMIS). A facility established by the Federal Aviation Agency (FAA) and/or Department of Transport (DOT) to provide for collection, processing, and dissemination of flight movement information for use by air defense facilities.

3. Air Route Traffic Control Center/Area Control Center (ARTCC/ACC). Federal Aviation Agency (FAA), and Department of Transport (DOT) facility established to provide adequate supervision of air traffic within a specified control area.

4. Correlation Line or Point. A reference line or point(s) established by NORAD region or division commander(s) from which "penetration" or "time-over" for a flight is computed for the purpose of flight plan correlation. A correlation point is any point used for flight plan correlation purposes.

5. Defense Area. Airspace over the United States or Canada other than airspace designated as an Air Defense Identification Zone, but within which the ready control of air traffic is required in the interest of National Security during Air Defense Emergency.

6. Defense Visual Flight Rules (DVFR). Visual flight rules (VFR) applicable to flights which originate within, operate within, or penetrate an air defense identification zone toward the combat zone.

7. Established Track. A radar plot on which movement has been confirmed by subsequent radar data. (Normally, a track will be established within two minutes.)

8. Flight Plan Information (Air Movement Data). A statement of the air traffic clearance and procedures to be followed on a particular flight. This data is processed by an Air Movements Information Section and forwarded to the appropriate Air Defense Direction Center(s).

9. Free Area. A specified area, as defined by a NORAD/CONAD region commander, within an Air Defense Identification Zone. All air traffic originating and remaining within the boundaries of such an area in accordance with prearranged procedures may be automatically identified as "Friendly" under conditions less than Air Defense Emergency.

10. Friendly (F). Identification of an airborne object based upon established criteria.

11. Hostile (H). Identification of an airborne object as being hostile in intent based upon established criteria.

12. KAA-29. A voice authentication code used primarily for air-to-ground and ground-to-air communications.

13. Air Defense Emergency. An emergency condition, declared or confirmed by either CINCNORAD or CINCONAD, or higher authority, which exists when attack upon the continental United States, Alaska, Canada, or U.S. installations in Greenland by "Hostile" aircraft or missiles is considered probable, is imminent, or is taking place.

14. Pending (P). An established track for which identification action may be required.

15. Reporting Point. A geographical location in relation to which the position of an aircraft is reported.

16. Unknown (U). A track identification indicating a track which cannot be otherwise identified within a specified period of time.

17. Origin. Refers to the point of initial radar detection.

INTERCEPTION AND RECOGNITION PROCEDURES

1. General. All interceptor aircraft engaged in air defense activities in defense of the North American continent, and the approaches thereto, wherein CINCNORAD/CINCONAD exercises operational control, will be governed by the following interception and recognition procedures when scrambled for an identification interception:

a. Interceptors will fly no closer to the intercepted aircraft than is necessary for positive visual recognition.

b. Dangerous or reckless flying for the purpose of obtaining recognition is prohibited.

c. Practice intercepts will not be made against civilian aircraft.

d. Every effort will be made by the interceptor pilot to prevent startling intercepted aircraft crews. The effect desired is one which assures personnel in the intercepted aircraft that the interceptor is making a routine investigation in the interest of properly conducting the mission of this command.

e. VFR and IFR interception patterns will be in accordance with standard tactics prescribed by the component command to whom the interceptor is assigned.

f. Identification by interplane radio communication will not be attempted by interceptor pilots except when ordered by the controlling air defense facility. When so ordered by the controlling air defense facility, and upon intercepting jet and four or more engine type bomber aircraft, interceptor pilots will further challenge the bomber for recognition purpose. The interceptor pilot will fly alongside the bomber on a steady course and contact the bomber on UHF radio, and challenge, using KAA-29. Correct answer by the bomber to the voice challenge may be used to identify the aircraft as "Friendly."

g. The interceptor pilot will keep the controlling air defense facility advised of marginal conditions of visibility.

h. When more than one interceptor is employed on an interception, only one pilot will effect visual recognition. The remaining aircraft will maintain surveillance from a position where an attack could be made against the intercepted aircraft. One such surveillance aircraft will, where possible, record the identification particulars as transmitted by the pilot effecting visual recognition.

i. The pilot effecting recognition, or another member of the intercept force, will report the quantity, type, nationality, ownership, and any unusual behavior of the intercepted aircraft to the controlling air defense facility in accordance with established reporting procedures. Aircraft serial numbers or registration letters will be obtained and reported only when considered necessary, and requested by the controlling air defense facility.

j. If the intercepted aircraft is positively identified as "Friendly," the interceptor will withdraw immediately and proceed in accordance with instructions received from the controlling air defense facility.

k. If the intercepted aircraft cannot be positively identified as "Friendly," the interceptor will maintain surveillance and contact the controlling air defense facility for further instructions.

l. The controlling air defense facility, when unable to identify an aircraft through information passed by the interceptor pilot, or other means, will immediately notify the appropriate NORAD region combat center giving all relevant information.

VIOLATION/INCIDENT REPORTING PROCEDURES

Military and civil aircraft which do not comply with published identification procedures and criteria will be reported by NORAD region and CONAD division commanders in accordance with the following violation and/or incident reporting policy.

1. Violations of Air Defense Identification Zones whose areas are associated solely with Canada or the United States will be forwarded through appropriate channels as directed by Canadian or U.S. directives.

2. Violations of Air Defense Identification Zones within a NORAD region whose area of responsibility encompasses the land mass and seaward approaches of both Canada and the United States will be processed as follows:

a. United States military aircraft violations, regardless of where the violation occurs, will be routed to appropriate U.S. authorities in accordance with instructions provided by USAF Air Defense Command and Alaskan Air Command. In addition, if the violation occurs within Canadian airspace, a copy of the violation report will be routed as directed by Canadian Forces Air Defence Command Instructions (CFADCI).

b. Canadian military aircraft violations, regardless of where violation occurs, will be routed to appropriate Canadian authorities in accordance with instructions provided by CFADCI.

c. All Canadian and U.S. civil, foreign civil, and foreign military aircraft violations will be routed through the national channels depending on where the violation occurs. If appropriate to continental U.S. airspace, they will be routed as directed by ADCR 55-24, Alleged Violations of ADIZ and Prohibited Area Flying Rules. If appropriate to Canadian airspace, they will be routed as directed in CFADCI. If appropriate to Alaskan airspace, they will be routed as directed by AACR 55-45.

3. Violations of Air Defense Identification Zones associated with nations other than Canada and the U.S. will be forwarded by the CONAD commander in accordance with instructions promulgated by Headquarters USAF, USAF ADC and the nation concerned.

4. Format for reporting will be in accordance with instructions contained in the Canadian or U.S. documents, whichever applies.

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NORAD--THE NORTH AMERICAN AIR DEFENSE COMMAND

about 10 unidentified objects a day on scopes P.6.

MISSION

The mission of the joint United States-Canada command, NORAD, is air defense of North America.

EVOLUTION

The North American Air Defense Command was established in September 1957. On May 12, 1958, the official agreement was signed by the governments of Canada and the United States which, in effect, was official cognizance of the fact air defense of the two countries is an indivisible task.

Shortly after World War II, a high-level Canada-U.S. committee (the Military Cooperation Committee) drew up an emergency plan for the common defense of North America and directed air defense organizations of the two countries to prepare detailed emergency air defense plans. The first of these was issued in 1950.

(MORE)

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The same committee authorized a combined planning group of representatives from the Royal Canadian Air Force and the United States Air Force air defense commands early in 1954. This group later moved to the present headquarters of NORAD at Colorado Springs. Its studies confirmed the fact that the best air defense of the continent is an integrated defense, with forces of both countries operating under a single command responsible to both governments.

A subsequent study two years later resulted in the same conclusion. Integration of operational control of the two countries was recommended.

In the interim, the two countries had gone ahead with the development of a joint radar warning network. Together they built the Pinetree system of radars across southern Canada. Canada started the Mid-Canada Line, and across the northern rim of the continent the United States began the Distant Early Warning Line. Conditions for operation and manning of these lines were mutually agreed upon.

Thus, by 1957 there had been a considerable history of joint planning, coordinating, and sharing, and the need for further integration had been recognized. In August of that year, the U.S. Secretary of Defense and the Canadian Minister of National Defence announced agreement by the two governments to set up a system of integrated operational control of the air defense forces and establishment of an integrated headquarters. On Sept. 12, 1957, NORAD was established, followed by the signing of an official agreement by both countries May 12, 1958.

This agreement provided, among other things, that NORAD be maintained for a period of 10 years or such shorter period as agreed by both countries. The commander in chief of NORAD was to be responsible to the Chiefs of Staff Committee of Canada, now superseded by the Chief of the Canadian Defence Staff, and the Joint Chiefs of Staff of the United States Command would pass to the deputy commander in chief during his absence. The appointment of the commander in chief of NORAD and his deputy had to be approved by both governments, and it was stipulated they would not be from the same country.

FORCES MAKING UP NORAD

NORAD has operational control of the air defense forces of both the United States and Canada. These forces are provided by NORAD component commands--U.S. Army Air Defense Command, USAF Air Defense Command, Canadian Armed Forces Air Defence Command--and by the U.S. Navy. Operational control is defined as the power of directing, coordinating, and controlling the operational activities of available forces. These military services are responsible for providing trained and equipped forces to the NORAD commander in chief for his operational control.

The Army Air Defense Command contribution to NORAD includes Nike Hercules and Hawk surface-to-air missiles and the fire distribution systems established in each defense area to coordinate their battle actions. The Active Army is supported in its role by the Army National Guard, whose Nike Hercules units are an integral part of the around-the-clock air defense.

The Army Air Defense Command's nation-wide task organization provides the ultimate ring of defense against air attack for more than 20 major target centers in the U.S. There are more than 110 Army air defense batteries equipped with the nuclear-capable Hercules.

U.S. Navy space watchers are active in NORAD. The Navy's Space Surveillance System is part of the NORAD Space Detection and Tracking System (SPADATS). In addition, Navy and Marine Corps jet fighter interceptors would be available as augmentation forces in an emergency situation.

The bulk of NORAD's fighter-interceptor squadrons are provided by the U.S. Air Force Air Defense Command. This organization, the largest component command in NORAD, also contributes the surface-to-air Bomarc missile and a large number of radar squadrons and early warning airborne radars. USAF ADC also is active in space with the Ballistic Missile Early Warning System and Spacetrack providing information to NORAD on ballistic missiles and orbiting space objects. The Air National Guard also provides interceptor squadrons and aircraft control and warning squadrons on full-time assignment to NORAD through USAF ADC.

In the weapons field, the Canadian Armed Forces Air Defence Command provides fighter-interceptor squadrons equipped with CF-101B Voodoo aircraft and two surface-to-air Bomarc missile squadrons. The command also contributes heavily in the air surveillance and in detection and identification functions.

A Canadian Baker-Nunn camera is among the devices providing information on satellite traffic to NORAD's Space Defense Center.

The Alaskan Command is a U.S. unified command with a twofold mission: ground defense of Alaska and air defense. The commander in chief of the Alaskan Command is responsible to the commander in chief of NORAD for the part of his mission dealing with air defense. Thus, all forces engaged in the aerospace defense of North America are under the operational control of a single commander.

 (MORE)

METHOD OF OPERATION

The NORAD mission has been broken down into three basic actions . . . detect, determine intent, and, if necessary, destroy.

DETECTION

NORAD must watch the whole area over the North American continent from just above the ground to beyond the atmosphere. For this it has three different surveillance systems, all feeding information into the combat operations center at Colorado Springs.

Manned Bomber Surveillance: First is the manned bomber surveillance network. The populated areas of Canada and the United States are covered by a massive network of radars. This is extended out to sea off both coasts by Air Force radar planes. Farther north, on the edge of the continent, is the Distant Early Warning Line, which extends from the western portion of the Aleutian Islands across Greenland.

Ballistic Missile Warning: A second NORAD detection system is the Ballistic Missile Early Warning System. BMEWS sites are at Thule, Greenland; Clear, Alaska; and at Fylingdales Moor, England. The huge radars at the BMEWS sites can detect a missile as far as 3,000 miles away. The system will provide a minimum warning of around 15 minutes of the approach of a missile attack. Such warning is transmitted automatically and displayed in NORAD's combat operations center. BMEWS data are transmitted to Strategic Air Command headquarters, the Pentagon and National Defence headquarters, Ottawa.

 (MORE)

Satellite Detection: A third surveillance system is the Satellite Detection and Tracking System. This network of radar, radio and optical sensors concentrated in the northern hemisphere supplies the NORAD Space Defense Center with information on earth-orbiting satellites.

DETERMINATION OF INTENT

Detection of aircraft must be followed by rapid and accurate identification. Because the enemy can choose the time and place of an attack, NORAD must know the identity of aircraft over or approaching the continent at all times.

Stringent rules have been imposed on all air traffic penetrating or operating within air space designated as Air Defense Identification Zones. These zones are established around the coasts and borders and the northern extremities of the NORAD area of responsibility. The principal method of identification is based on flight plan correlation. Information obtained from inflight amendments and position reports is compared with an actual radar track of an airborne object. If the information on the flight and the track correlate within established criteria, the track may be identified as "friendly." If the flight plan information and track do not match, or if there is any doubt, the flight is categorized as "unknown" and interceptors may be scrambled to make visual identification.

With somewhat more than 200,000 aircraft flights taking place within NORAD air space in any given 24-hour period, it is a rare day when none of these shows at the NORAD combat operations center as "unknown." However, the average number of "unknowns" in the system has steadily declined over the years until now that number is less than 10 per day. Of these, it is common to find two or three instances where interceptors are scrambled but recalled before intercept due to further communications checks. The remaining "unknowns" are intercepted and visually identified by the interceptor crew.

In an emergency, the regular fighter-interceptor squadrons in the NORAD system would be augmented by available fighter aircraft of the U.S. Navy, U.S. Marine Corps, other U.S. Air Force commands, the Air National Guard, and interceptor training units of the Canadian Armed Forces Air Defence Command. All these forces are highly mobile and constantly practice dispersal and forward base deployment.

DESTRUCTION

The NORAD concept of waging aerial warfare is of a family of weapons providing a defense in depth. The aim is to subject an invading force to continuous attack from as far out as possible as it approaches a target area. An enemy bomber would first be attacked by long-range manned interceptors, next by pilotless interceptors of the Bomarc type, and finally by Nike Hercules and Hawk missiles.

The AIR-2A Genie nuclear air-to-air rocket and the AIM-26A Falcon nuclear guided missile tremendously increase the kill capability of the fighter interceptor. Detonated in a formation of enemy bombers, either weapon would wreak havoc on the attacking aircraft. Not only would the bomber be destroyed, but its load of nuclear weapons would be neutralized, literally "cooked," thereby minimizing the likelihood of explosion of the nuclear bomb with its subsequent lethal "fallout."

The medium-range surface-to-air Bomarc missile (approximately 400 miles range) carries a nuclear warhead, and the shorter-range Nike Hercules (more than 75 nautical miles range) is nuclear capable. The Hawk missile carries a high-explosive warhead.

(MORE)

COMMUNICATIONS AND CONTROL

Tying the whole detection, tracking and weapons system of NORAD together is a vast communications network. Information from the detection system is transmitted rapidly to control centers located all over the continent where it is assessed and evaluated. Instructions are passed quickly to the interceptor pilots and missile crews. This information is processed and displayed rapidly and accurately so that the commander can make continuous estimates of the situation and, if his area is attacked, direct the air battle.

Elaborate duplication is found within the system to allow for survivability after battle damage. Command control can be passed from region to region as the situation demands.

Since July 1958, NORAD has moved into the electronic data-processing field through use of the Semi-Automatic Ground Environment system. SAGE added high-speed digital computers to the control process. It is able to receive, process and display aerospace surveillance information and, as directed, send guidance instructions or information to weapons.

Backing up SAGE is the Back-Up Interceptor Control, or BUIC. This is a dispersed system of transistorized and automated control centers designed to provide, as the name implies, back-up capability in the event SAGE becomes inoperative.

NORAD has one underground SAGE center, at North Bay, Ontario, Canada, the headquarters of Northern NORAD Region. Collocated here is the headquarters of the Canadian Armed Forces Air Defence Command.

(MORE)

COMBAT OPERATIONS CENTER

The nerve center and hub of the whole system is the NORAD combat operations center inside a mountain near Colorado Springs where information from the entire network is received and evaluated. This center is linked by the communications system to all NORAD subordinate commands and command posts and all key agencies over the continent. From here an attack warning would be given to the air defense system, to Ottawa and Washington, to the Strategic Air Command, the Civil Defense agencies of both countries, the Pentagon and the Canadian National Defence headquarters.

COMBAT READINESS

To be able to defend North America against a surprise attack, NORAD must keep all elements of the air defense system in top condition. This is achieved by constant training of the various parts of the system and of the system as a whole in realistic exercises.

Exercises involving command and control centers, radar sites, interceptor units and air defense artillery units are constantly in progress. Specialist groups are employed full time in the business of testing, probing and evaluating the combat readiness of NORAD units.

In addition to keeping fit with the equipment and weapons now in its arsenal, NORAD is constantly trying to improve the system to keep up with the rapidly moving advances in offensive weapons and vehicles that could deliver them to this continent.

To meet this challenge, NORAD must continue to deal with the manned bomber threat for some time to come, and, at the same time, prepare for defense against the ballistic missile.

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Computer Systems

NORAD COMBAT OPERATIONS CENTER

Move of North American Air Defense Command's combat operations center inside 100-million-year-old Cheyenne Mountain introduced a new dimension in aerospace defense.

For more than a decade, the combat operations center, vital to the survival of populations of Canada and the United States, was housed in a two-story block-house structure at Ent Air Force Base in Colorado Springs.

Its vulnerability was summed up succinctly and candidly by a former NORAD commander, who stated that "One man with a well-aimed bazooka shot could immobilize our present COC."

Today, air defense specialists work one-third of a mile inside a mountain with a 1,400 foot granite roof as their sky--the hypothetical invader with bazooka has become an absurdity.

(MORE)

To the heart of this granite cocoon the first warning of air attack on this continent would come, and from it the air battle for the survival of Canada and the United States would be directed.

A small, selective audience sits in a capsulized amphitheater. They are top air defense officers of Canada and the U.S.--spectators who are allowed to play featured roles in the plot that unfolds on the stage before them.

The nuclear age has dictated that they carry out their responsibilities inside a solid granite mountain. Modern technology in the art of communications and electronics has compensated and allowed them to detect and defend against an enemy violation of an airspace they cannot see.

Toward this end, the commander in chief of NORAD and his battle staff are provided instantaneous information from the many detection networks employed on the North American continent. These data-gathering sites are the lifeblood to the heart of the air defense of Canada and the U.S.

Men and equipment, the majority in isolated locations, are on alert around the clock to insure that this information flows into the mountain outside of Colorado Springs. They work on the Distant Early Warning Line, Ballistic Missile Early Warning System and the space satellite detection and tracking system. Information gathered from these outposts combined with the reporting NORAD regions presents an up-to-the-minute air defense picture of the continent.

All this vital intelligence is available to the NORAD commander in chief at his center-level command position in the three-dais designed command post. With him

 (MORE)

at this level are the director of the combat operations center; the command director and his assistant operating the command and control system; and three technicians to handle communications and displays.

Directly above the NORAD commander on the third level sits the intelligence watch officer who is on the receiving end of the Intelligence Data Handling System. Sharing this upper level with him are the Civil Defense National Warning Center, the Federal Aviation Agency and the Canadian Department of Transport. All these agencies have integral roles in the aerospace defense picture.

Manning the lower level are additional key members of the NORAD battle staff, along with commanders of the component forces that make up the aerospace defense system.

Within the command post itself, direct communications links with Strategic Air Command, the National Military Command Center in Washington and National Defence headquarters in Ottawa are instantly available to the battle staff.

Keystone of the operations structure's strength is a specially designed command and control system, its creation a joint civilian industry-military venture.

MITRE Corporation of Lexington, Mass. was system designer, with System Development Corporation of Santa Monica, Calif. contributing the computer program so necessary to make the equipment function in an integrated system.

Burroughs Corporation of Paoli, Pa. was the equipment contractor.

The military role was delegated to Air Force Systems Command. Their Electronic Systems Division was responsible for over-all management and installation of the complex communications setup.

Maintenance on the communications system is done by military technicians of the U.S. Air Force's Air Defense Command, a major component of NORAD.

Information, complete and current, is one of the most valuable weapons in the arsenal available to the NORAD commander in chief as he and his staff exercise tactical control of the continental defense system.

The flow of data from many sources coming into the mountain must be put into a usable form. Philco Corporation solved this need with its input-output data controller which was designed specifically for the COC operation.

The controller converts signals into data that can be used by the computer or stored in it until needed by the machine's human masters. Versatile, it can reverse the procedure by taking the data already stored and converting it back into signals for transmission to distant sites in the continental defense system.

Responsible for this feat is the multiplexer--a switching device in the controller which transfers information to and from the computer. The scanner, which is part of the computer, routes information received from the multiplexer to the display equipment for viewing by defense officers or sends it to the memory core for storage.

A closed circuit television network with 20 channels, plus 15 display console groups, provides a showcase for the millions of pieces of information received by the data controller and stored in the computers.

Each display console is manned by a NORAD military operator with a specific support function. Four are operated in the command post by battle staff members,

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while the remaining eleven are in areas needed for support of command operation, such as Logistics or Damage Analysis.

The outstanding feature of these consoles is their ability to translate signals from electronic language into a form that humans can understand. Numerical, alphabetical or diagrammatical information are all within their capability.

Without leaving his chair, an operator can "build a display" of the North American continent that will show tracks of suspected or known enemy air activity. For a more complete story of this track, the information stored in the memory of the computers can be called upon to add its part to the over-all picture.

Arrangements have been made to provide this picture to all the air defense officers who are manning the command post. Consoles on the command dais (middle level) can transfer information to a large screen display upon request of the commander in chief.

This display is provided by two 12-by-16 foot screens standing in the forward section of the command post and visible in all parts of the room.

Once information has been displayed on a small console, it can be shown in seven colors on the large screen. Color enlargement from console to screen can be accomplished in the total elapsed time of eleven seconds.

This is done by the console operator starting a display cycle color request on his machine's cathode ray tube. This tube is similar to one found in an ordinary television set.

The request goes through the data display controller to the computer. Here the color-coded information is sent back to the data display unit, where it is converted to electrical signals that operate the deflection coils of a cathode ray tube in the camera processor-projector.

What was originally in black and white on the operator's console is now in the processor-projector. It is here that three shuttered lenses of a single camera are brought into play.

Each focuses on a section of 35-millimeter film, as each lens faces the tube in the processor-projector. On a signal from the basic display unit, the shutters representing red, green and blue operate, taking three photographs of the display.

The film goes through a cycle of develop, rinse and bleach. Then it is halted and subjected to a 6,500-watt Xenon lamp single light-source projection head and the three photographs are individually projected through filters of red, green and blue, which combine to form a seven-color final product on the display screen.

Illumination of the color display is 2 1/2 times the intensity of a motion picture screen. The whole operation, once again, in 11 seconds.

This truly unique process and equipment were created by Optomechanisms of Plainview, N.Y.

The other screen serves to project static displays, manually updated, which supplement the electronically displayed information.

This information is generally concerned with space satellites, submarines and surface craft. A regular vu-graph is used in this projection, where instantaneous response is not required.

The NORAD underground combat operations center, with its attendant equipment and procedures, is doing a job that is necessary today. By design it will adjust to the requirements of tomorrow, as the aerospace defense of the North American continent remains "top priority" in the two nations' defense policy.

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NORAD REGULATION
NO. 101-1
CONAD REGULATION
NO. 101-1

HEADQUARTERS NORTH AMERICAN AIR DEFENSE COMMAND
HEADQUARTERS CONTINENTAL AIR DEFENSE COMMAND
Ent Air Force Base, Colorado
1 December 1966

Electronic Systems

ELECTRONIC INTERFERENCE/ECM TECHNICAL REPORT

PURPOSE. Outlines the peacetime procedures to be followed in submitting and processing technical reports of electronic interference in order to collect specific data with which scientific analysis can be conducted to identify and eliminate friendly sources of interference and to determine the capabilities of unfriendly jamming equipment.

★1. Scope. Directive upon all subordinate commanders, commanders of component commands, and upon commanders of forces under the operational control/command of the Commander-in-Chief.

★2. General.

a. Accurate and timely reporting of most electronic interference and all ECM activity of suspected unfriendly origin is essential to advise all operating and command levels of factors that may degrade aerospace defense operations. The detailed information provided by the Electronic Interference/ECM Reports is necessary for thorough analysis and evaluation of the effects of the interference/ECM. Therefore, in peacetime these reports will permit the determination of operational procedures and/or equipment design changes required to improve the NORAD/CONAD system. In addition, information on capabilities, effects, and techniques of both friendly and enemy ECM equipment may be determined.

b. The instructions contained in this regulation do not preclude USAF ADC units from reporting electronic interference in accordance with AFM 100-31.

3. Submission of Reports.

★a. The following units will submit a NORAD Form 29, Electronic Interference/ECM Technical Followup Report, in each case of electronic interference/ECM to radar, communications or IFF during DEFCON 5, except as indicated in subparagraphs b and c below.

NOTE: Jul 65 edition of NORAD Form 29 which is titled Electronic Interference/ ECM Technical Followup Report will have the word "Followup" crossed out. On reprint of this form, the word "Followup" will be deleted from the title.

This supersedes NORADR 101-1, dated 30 July 1965
OPR: NEEC/CEEC
DISTRIBUTION: NORAD - A, B, D, E, F, G, H, I, K, L, M
ARADCOM - A-1, N, NG
USAF ADC - S

★Indicate significant changes

NORAD-ADC Field Printing Plant
Ent AFB, Colorado

Atch 2

(1) All USAF ADC Radar Squadrons, including AEW&C and ALRI Squadrons.

(2) USAF ADC BMEWS Space Track and Space Weapons Systems Sites.

(3) ACW Squadrons in Alaska.

(4) Fighter-Interceptor Squadrons.

(5) RCAF ADC Radar Squadrons.

(6) All-Weather Fighter Squadrons.

(7) ARADCOM Fire Units and AADCPs.

b. The report will be submitted only:

★(1) When the reporting unit is performing a NORAD/CONAD function.

(2) On a one-time basis when recurring incidents are caused by known friendly equipment near or adjacent to the affected equipment (i.e., TV, altimeter, radar beacon).

c. Submission of the report is not mandatory for:

(1) Interference generated within the equipment affected.

(2) Scheduled jamming such as that conducted during exercises.

(3) Interference occurring during periods of sufficient operational activity to make impractical the recording of the required data. This includes, but is not necessarily limited to, actual combat, periods of increased DEFCON, large-scale exercises and periods of liability therefor.

4. Format of Reports.

a. Reporting units will complete NORAD Form 29, Electronic Interference/ECM Technical Followup Report in accordance with instructions on the form and this regulation.

b. The following units will attach to NORAD Form 29 a chronological series of photographs of radar display equipment showing the effects of the electronic interference/ECM:

(1) Sites in Alaska.

(2) DEW Stations.

★(3) Stations in 37th NORAD Division.

(4) Sites in Florida.

(5) AEW&C and ALRI Aircraft.

★ (6) BMEWS and Space Weapons.

(7) All other radar stations within 50 nautical miles of the Atlantic Ocean, Pacific Ocean, or the Gulf of Mexico.

c. Units not listed in subparagraph b above will attach to NORAD Form 29 a chronological series of sketches or drawings of radar display equipment showing the effects of the electronic interference/ECM.

d. Units experiencing communication interference shall submit tapes or detailed description of the interference where tapes are not available.

e. Units experiencing IFF interference shall submit photos and/or detailed descriptions as available.

5. Processing of Reports. Reporting units will submit Electronic Interference/ECM Technical Reports in accordance with the following:

a. The original and one copy of the report will be forwarded via Chain of Command to this headquarters, ATTN: NEEC/CEEC. Sufficient copies of the report will be prepared to provide a file copy for each higher headquarters which must process the report.

b. Commanders will review and investigate each report and forward the report to the next higher headquarters by letter of transmittal. This letter will include the commander's comments, investigation results and recommendations.

c. The report will be processed so as to arrive at Headquarters NORAD not later than 15 days after electronic interference/ECM was experienced.

6. Records. Commanders will insure that appropriate records pertaining to Electronic Interference/ECM Reports are maintained within their commands for a period of one year from date of the report.

★ 7. Reports Control Symbol. Electronic Interference/ECM Technical Reports are exempt from a Report Control Symbol assignment by authority of paragraph 3k, AFR 300-5.

8. Augmentation Information Folder. A copy of this regulation will be maintained in the Augmentation Information Folder (AIF), (reference NORAD Regulation 55-5, Augmentation Information Folder (AIF)).

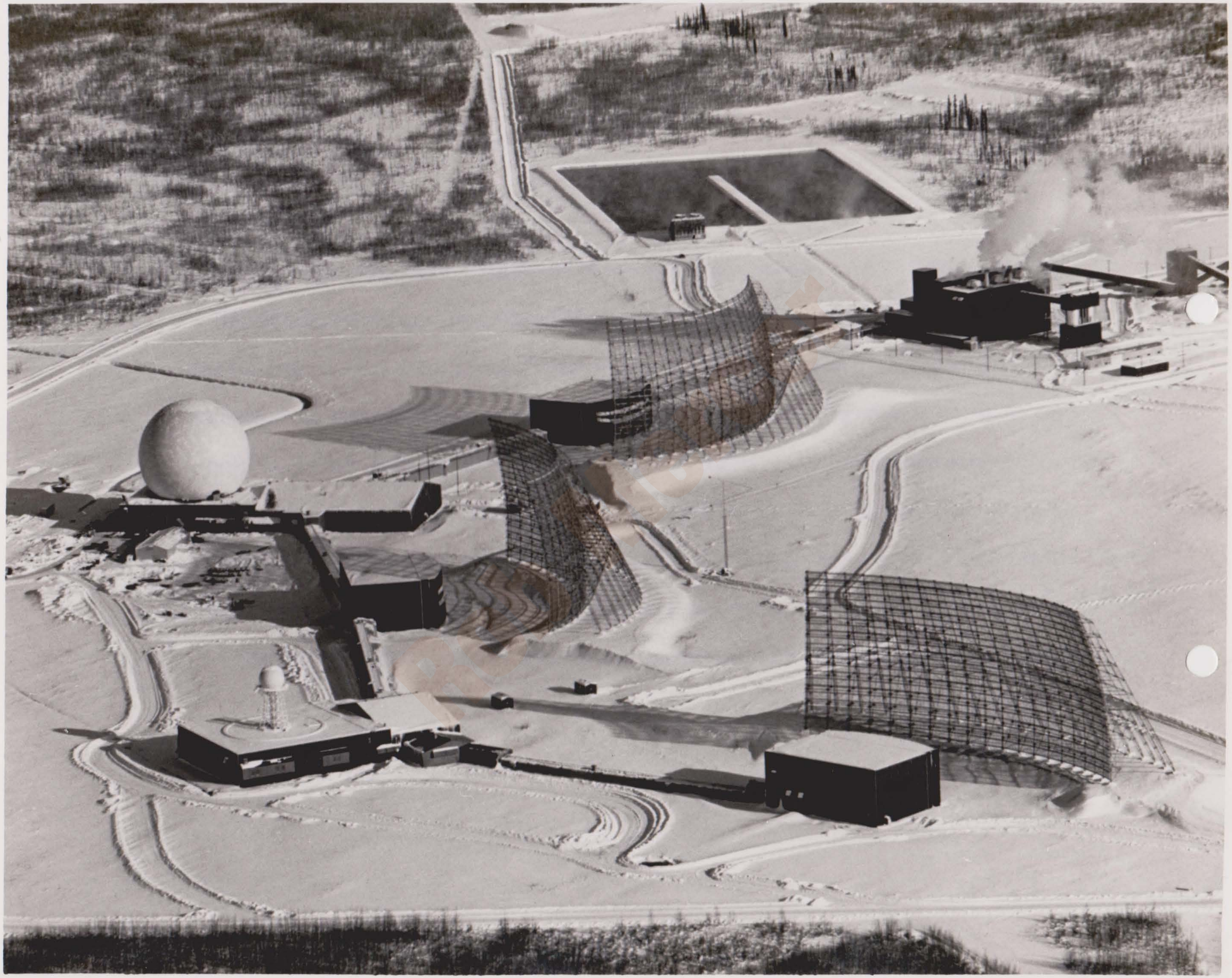
FOR THE COMMANDER-IN-CHIEF:

HEADQUARTERS
OFFICIAL
CONAD/NORAD

M. M. MAGEE
Major General, USA
Chief of Staff

HENRY P. DAVIS, JR.
Lieutenant Colonel, USAF
Director of Administrative Services


CURRENT AIR SITUATION
S-30
S-8
TIME 1535Z
EXD 09/0233 EXR
ASST FOR COMM



BMEWS

OUTPOST ON ALERT -- Radar antennas at one of the outposts in the North American Air Defense Command's Ballistic Missile Early Warning System cast long shadows across an Alaskan landscape. The same devices throw long radar beams 3,000 miles or more out over the top of the world to spot an intercontinental ballistic missile strike against North America and pass the alert to NORAD's Combat Operations Center. This BMEWS station, at Clear, Alaska, uses a combination of one scanner/tracker radar, under the 140-feet-in-diameter dome at left, plus the three stell-webbed detection radars which stand 400 feet long and 165 feet high. The system, which has other radar sites at Thule, Greenland, and Fylingdales Moor, in northern England, also supplies data on orbiting satellites to NORAD's Space Defense Center.

Neg #741-66

90067

A D C

AEROSPACE DEFENSE SHOWCASE -- Showcase for signs of aerospace attack against Canada and the United States is this display screen deep underground in the North American Air Defense Command's Combat Operations Center. By pushing buttons, battle staff members can take an elecronic look at the sky and space approaches to North America or call up computer-stored information such as the status of defensive weapons. Built more than 1,400 feet below the granite top of Colorado's Cheyenne Mountain, this is the nerve center which would give the first warning of attack and the command post from which the defensive air battle would be directed.

(NORAD PHOTO)

Neg #316-67

100067

NORAD
NORTH AMERICAN AIR DEFENSE COMMAND
NEWS SERVICE
August 11, 1967 No. 144

UFOs

Not Saucers, No Threat

Says NORAD

COLORADO SPRINGS—(NNS)—None have been identified as flying saucers, and they are no threat.

That is the word on UFOs — Unidentified Flying Objects—from the North American Air Defense Command, the organization concerned with unfriendly objects in the air space over the United States and Canada.

NORAD's answer on the question of UFOs is that as far as the command is aware, they have never been shown to be anything but natural atmospheric or astronomical phenomena or airborne objects—birds, insects, hardware—seen under unusual circumstances or misinterpreted.

About 95 per cent of all UFO sightings have been identified, none as saucers, all as natural physical phenomena, command officials note.

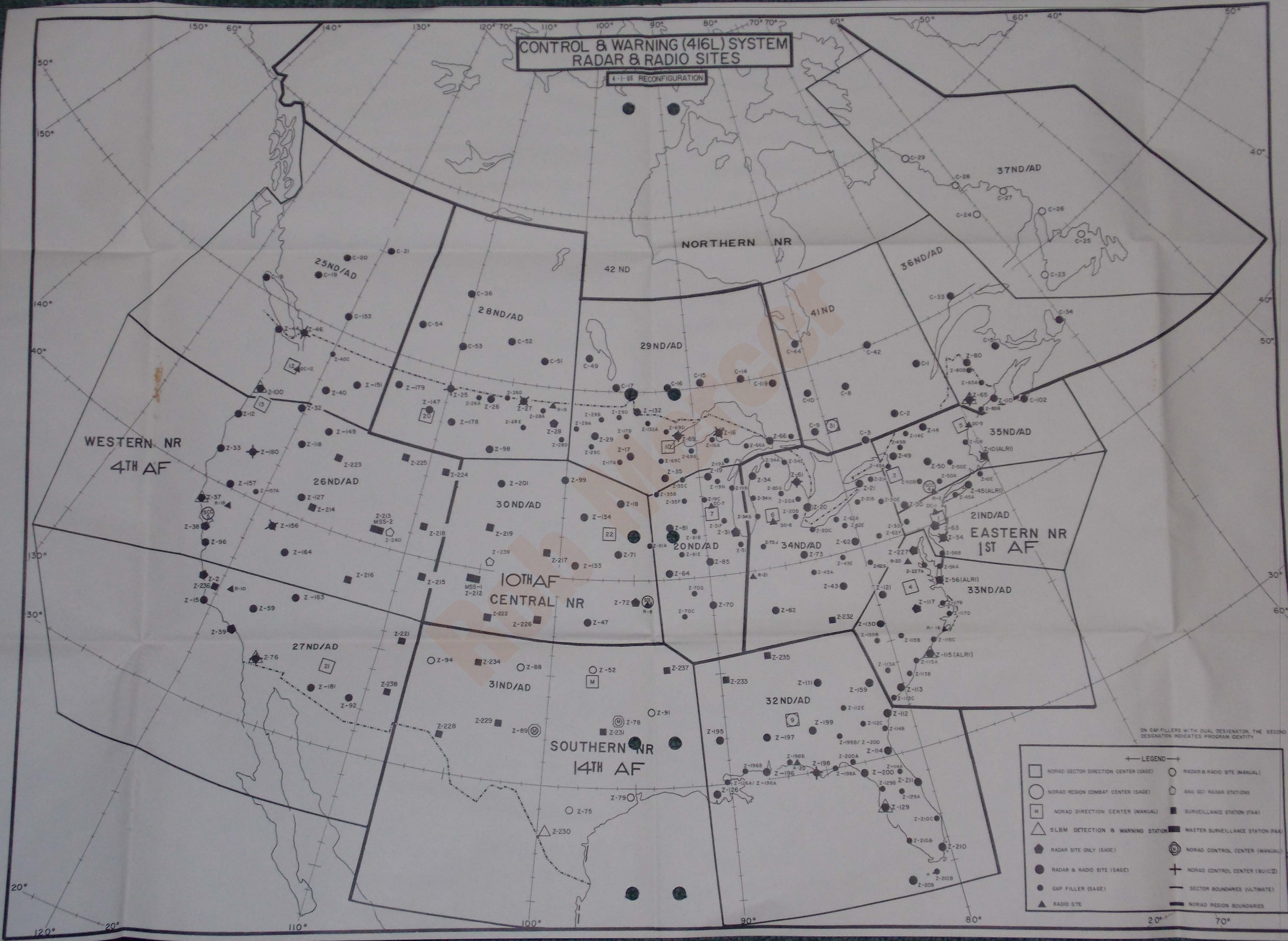
Much of what is reported is bona fide space activity—satellites. Nearly 1,200 man-made objects are orbiting the earth, according to the tally in NORAD's Space Defense Center, and some are visible.

As for the five per cent of UFO sightings which remain unidentified, NORAD says there is no evidence of any threat whatever to North America.

The North American Air Defense Command is concerned with threats to the continent.

Its position is that if there is something that represents a threat, and it flies, it must be in the form of hardware. If it is hardware, NORAD radars will detect it and NORAD will identify it.

The command says it is not concerned with transitory or illusory phenomena often reported as UFOs.


CONTROL & WARNING (416L) SYSTEM
RADAR & RADIO SITES
4-1-66 RECONFIGURATION
NORTHERN NR
42 ND
25ND/AD
28ND/AD
29ND/AD
41ND
36ND/AD
37ND/AD
WESTERN NR
4TH AF
26ND/AD
30ND/AD
20ND/AD
34ND/AD
35ND/AD
21ND/AD
EASTERN NR
1ST AF
33ND/AD
10TH AF
CENTRAL NR
27ND/AD
31ND/AD
SOUTHERN NR
14TH AF
32ND/AD
ON GAP FILLERS WITH DUAL DESIGNATOR, THE SECOND DESIGNATION INDICATES PROGRAM IDENTITY
LEGEND
NORAD SECTOR DIRECTION CENTER (SAGE)
NORAD REGION COMBAT CENTER (SAGE)
NORAD DIRECTION CENTER (MANUAL)
SLBM DETECTION & WARNING STATION
RADAR SITE ONLY (SAGE)
RADAR & RADIO SITE (SAGE)
GAP FILLER (SAGE)
RADIO SITE
RADAR & RADIO SITE (MANUAL)
AND GCI RADAR STATIONS
SURVEILLANCE STATION (FAA)
MASTER SURVEILLANCE STATION (FAA)
NORAD CONTROL CENTER (MANUAL)
NORAD CONTROL CENTER (BUIC II)
SECTOR BOUNDARIES (ULTIMATE)
NORAD REGION BOUNDARIES