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The U.S. Navy's Role in Continental Air Defense

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HOMELAND DEFENSE WAS PUSHED to the top of the national security agenda when in August 1998 North Korea's flight test of its Taep'o-dong 1 ballistic missile sparked a renewed debate over national missile defense. The Navy has become embroiled in that debate because its theater ballistic missile defense programs could provide a foundation for developing a sea-based national missile defense. It is seldom remembered that the Navy in the recent past took on a significant homeland defense mission—continental air defense. The Navy excelled at the continental air defense mission but found it difficult to reconcile with its other missions of sea control, power projection, and forward presence. That experience is worth examining as we contemplate our role in national defense today.

The Cold War took a serious turn for the worse in 1954. During the early postwar years, the United States had been able to rely on superior military technology, particularly its sole possession of nuclear weapons, to counter the huge Soviet armies threatening Western Europe. The United States possessed an

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arsenal of long-range bombers and carrier-based naval aircraft capable of delivering nuclear weapons against the Soviet Union. The Soviets had exploded their first atomic device in 1949, but they lacked credible delivery systems to threaten the United States directly. In 1954, however, American superiority in delivery systems appeared to disappear almost overnight.

On 15 February 1954, *Aviation Week* published a sensational article describing powerful new Soviet bombers capable of delivering nuclear weapons at intercontinental ranges.[1] This and subsequent revelations over the next year and a half ignited a firestorm of controversy over alleged Soviet superiority in long-range bombers, dubbed the "bomber gap."[2] The U.S. Air Force, adhering to its doctrine of offensive air power, reacted to widespread concern about Soviet air power by pressing for accelerated production of the new B-52 bomber, but it also reluctantly endorsed calls for expanded air defense forces.

The first postwar American air defense efforts had been launched in 1948, in response to the Berlin blockade and early Soviet displays of their bombers, but with limited funding and largely obsolete equipment. This initial system covered only the northeastern United States; the Seattle and Hanford, Washington, area (Hanford being critical for atomic weapon production and within range of Soviet bombers); and the Albuquerque and Los Alamos, New Mexico, area (Los Alamos was involved in atomic weapon research and development). This initial system was expanded into an air defense system called LASHUP that also covered California, the upper Middle West, and the Tennessee Valley (where there were Atomic Energy Commission facilities critical to the atomic weapons program). From 1949 to 1954, LASHUP included early warning patrols by Navy radar picket destroyer escorts and PB-1W and PO-1W airborne early warning aircraft to guard the seaward approaches to the northeastern United States. Interest in bolstering the air defenses of the continental United States intensified after the Soviet nuclear test in 1949, and even before LASHUP became operational in 1950, studies had begun on a system to defend the entire continental United States. The first air surveillance radar system covering the entire northern approach to the United States—the "Pine Tree Line," stretching across southern Canada—became operational in 1951, but it was viewed as insufficient, because it provided inadequate warning time of a Soviet attack. Early warning patrols by Navy ships and aircraft off the northeastern United States continued after the Pine Tree Line was established.

Growing concern over the inadequacy of U.S. air defenses and the vulnerability of strategic air bases in the United States to attack by Soviet bombers led the Air Force in 1951 to initiate a study of air defense technology, designated Project LINCOLN, because it was led by the Lincoln Laboratory at the Massachusetts Institute of Technology (MIT)—the center of radar development during World War II. In the summer of 1952, a special assessment of the overall U.S. air defense system was conducted that brought together Project LINCOLN scientists with analysts from other research centers. The LINCOLN summer study recommended a crash program to build a line of early warning radars across

northern Canada. The armed services, especially the Air Force, were reluctant to endorse such an ambitious project, due to its cost; its demands would compete with other budget priorities at a time when newly elected President Dwight Eisenhower was making clear his intent to hold the line on defense spending. Nevertheless, the Eisenhower administration quickly initiated a program, known as "Project 572," to build the Distant Early Warning Line. The DEW Line was completed across Alaska in 1953 and across northern Canada in 1956; it was declared fully operational in 1957.[3]

Much more than early warning radar, however, was needed to improve continental air defense. The Army, Navy and Air Force all had air defense forces, but there was no coordination among them and no overall plan for defending the nation's airspace. To provide centralized command and control of air defense efforts, the Continental Air Defense Command (CONAD) was established on 1 September 1954. Headquartered at Ent Air Force Base in Colorado Springs, Colorado, CONAD was a joint command, reporting directly to the Joint Chiefs of Staff. The commander of the Air Force Air Defense Command was "dual hatted" as the commander in chief of CONAD (CINCCONAD). As the DEW Line extended across Canada between 1954 and 1956, it became clear that close coordination of American and Canadian air defense forces would be needed to engage effectively Soviet bombers penetrating North American airspace. Agreement was reached in August 1957, after lengthy negotiations, and the North American Air Defense Command (NORAD) was officially established on 12 September. CINCCONAD now gained an additional title as commander in chief of NORAD.[4]

The U.S. Navy's Role in Continental Air Defense

The Navy had gained significant experience in air defense during World War II. In the battles of Coral Sea and Midway and in several other engagements, the Navy had learned hard lessons on how to defend carrier task forces. These lessons had led to important developments in air search radar, combat direction systems, and air-intercept-control procedures. The Navy's bitter experience with Japanese kamikaze suicide planes late in the war had generated intense interest in the development of radar systems for long-range detection of low-flying aircraft. The Navy had deployed radar picket destroyers late in the war but had concluded that airborne surveillance platforms were necessary for extended detection ranges.[5]

In 1944, the Navy launched the first program for the development of airborne early warning radar and aircraft, thereby taking the lead in this vital technology. Lincoln Laboratory (then known as the Radiation Laboratory), working closely with the Naval Research Laboratory at Naval Air Station Anacostia in Washington, D.C., developed an airborne radar and a radio link to transmit radar video to displays in a ship's combat information center (CIC). This system was installed in TBM torpedo bombers (designated the TBM-3W,

the W standing for airborne early warning). By the time flight trials began in January 1945, however, the Navy had concluded that the video link did not permit the TBM-3W to operate at the ranges from its carrier task force necessary for early warning. The solution was to place the CIC in the aircraft. Commander Lucien F. "Red" Dodson proposed mounting the APS-20, a one-megawatt air search radar, in a large, long-range, land-based aircraft. Commander Dodson was placed in command of Patrol Bomber Squadron 101 (VPB 101), based at Naval Air Station Willow Grove, Pennsylvania, and development efforts began, using two Boeing B-17 Flying Fortress test beds already in the Navy inventory.[6]

For its first land-based airborne early warning aircraft, the Navy in 1945 purchased twenty new B-17Gs and modified each to the PB-1W configuration by sealing shut its bomb bay, removing the armament, and mounting an APS-20 air search radar in a large dome beneath the fuselage. The first PB-1Ws were delivered to VPB 101 in the spring of 1946; the Navy was to purchase a total of thirty-one. The PB-1W was a delight to fly, being much lighter than the original B-17G, but its lack of cabin pressurization made it cold and uncomfortable for the men operating the radar and tracking systems. In late 1946 VPB 101 was moved to Naval Air Station Quonset Point, Rhode Island, and redesignated Airborne Early Warning Development Squadron Four (VX 4). VX 4 moved from Quonset Point to Naval Air Station Patuxent River, Maryland, in July 1948; "Pax River," as it was commonly known, became the center of Navy airborne early warning for the next seventeen years. Lessons learned from flying the PB-1W were applied to development of the Lockheed PO-1W (a redesigned Lockheed 749 Constellation airliner later designated WV-1), which first flew in 1949, and to the highly successful Lockheed WV-2 (based on the famous L-1049G Super Constellation), which was first delivered to the Navy in 1954.[7]

When the mission of defending America's seaward flanks against Soviet long-range bombers arose, the Navy was ready with combat-proven radar picket ships, state-of-the-art airborne early warning aircraft, and significant air defense experience. Additionally, the Navy was already conducting surface and airborne radar surveillance patrols. A number of radar picket destroyer escorts (DERs)—World War II–vintage destroyer escorts brought out of "mothballs" and modernized with SPS-6 and SPS-8 air search radars—had been conducting limited radar picket patrols off the East Coast of the United States since 1951, extending radar coverage beyond the eastern end of the Pine Tree Line. VX 4 had been flying airborne early warning patrols with PB-1Ws since 1946 and with PO-1Ws since 1949.[8]

Although the Navy had the systems and expertise to do the job right, Admiral John J. Hyland, who commanded the Atlantic barrier forces from December 1959 to September 1960, has indicated that the Navy was reluctant to accept the barrier patrol mission:

> When the concept was first suggested, the Navy disagreed in the Joint Staff that it was essential. But when it became clear that someone was going to do it and it really was a chore over the sea, the Navy decided that it would be better to do it themselves rather than for some other service to do it. That's how the Navy got the job.[9]

The primary reason for the Navy's reluctance to assume the barrier patrol mission was the cost of operating and maintaining the forces that would be required. This concern was borne out by the eleven years the barriers were operational. Continual funding constraints made it difficult to devote sufficient resources to the mission.[10]

The Navy began detailed operational planning in 1953 for air surveillance radar patrols off the Atlantic and Pacific coasts, using land-based aircraft and radar picket ships reporting to Air Force air defense control centers ashore. A system of two radar barriers was established in September 1954 to guard the Atlantic and Pacific flanks of the United States. The Inshore Barrier consisted of Air Force ground-based air surveillance radars established along the Atlantic seaboard and mounted on three "Texas Towers" off the coast of New England, and of Air Force EC-121 airborne early warning aircraft, derived from the Navy WV-2. The offshore barriers—known as the Atlantic and Pacific Contiguous Barriers—were the Navy's responsibility. Although CONAD had requested that the Navy fill a total of nineteen radar picket stations, the Navy was able to fill only ten—five on each coast—due to funding constraints.[11] In November 1960 the Navy recommended that the Pacific Contiguous Barrier be disestablished, but NORAD disagreed, and the Joint Chiefs directed that it remain in operation.[12]

To provide centralized direction to the Navy effort, Commander Naval Forces CONAD (COMNAVFORCONAD) was established on 1 September 1954, at Ent Air Force Base. The first COMNAVFORCONAD had a staff of about forty-five personnel. Under him were three Navy commands supporting the major CONAD regions: Commander Naval Forces (COMNAVFOR) Eastern CONAD Region, COMNAVFOR Central CONAD Region, and COMNAVFOR Western CONAD Region. COMNAVFORCONAD coordinated the assignment and scheduling of Navy forces assigned to the air defense mission—radar picket ships, airborne early warning aircraft and airships, and fighter aircraft—but they were under the operational control of CONAD regional operations centers (ROCs).[13]

The Navy also placed jet fighters under Air Force control for continental air defense. VF(AW) 3, based at Naval Air Station North Island in San Diego, California, was placed under Air Force operational control in December 1955. This was the only Navy squadron permanently under Air Force operational control for air defense, and it twice won Air Defense Command's best-unit award. VF(AW) 3 primarily protected the seaward approaches to southern California, but from 1961 to 1963 it also deployed a detachment to Key West to augment

air defenses in southern Florida. Also, Navy carrier-based jet fighters (operating out of their home air stations ashore) were available to augment continental air defense forces in an emergency. In 1957, for example, an average of 1,200 Navy fighters were reported as being available to COMNAVFORCONAD for this mission. During the 1962 Cuban missile crisis, VF 41, flying the brand-new F-4H Phantom II fighter, deployed to Key West under Air Force control to augment air defense forces for southern Florida.[14]

As the Inshore and Contiguous Barriers were becoming operational, the need for a third radar barrier farther out to sea as an extension of the DEW Line was recognized. Detailed planning for the Atlantic and Pacific extensions of the DEW Line began in 1955. The Atlantic Barrier became operational in 1956 and the Pacific Barrier in 1958.[15]

The Atlantic Barriers

The Atlantic Contiguous Barrier stretched along the East Coast from Cape Cod to North Carolina. The barrier consisted of five radar picket stations (Stations 12, 14, 16, 18, and 20) about three hundred nautical miles off the coast. Originally, each picket station reported to a separate East Coast Air Force base air defense direction center (ADDC), but over the years the Air Force reorganized its air defense forces. From 1959 onward, Stations 12 and 14 reported to the ADDC at Otis Air Force Base in Massachusetts, and Stations 16, 18, and 20 reported to the ADDC at Cape Charles Air Force Base in Virginia.[16]

The radar picket stations on the Contiguous Barrier were, as noted, originally patrolled by DERs. The DERs were withdrawn on 31 March 1960 in favor of radar picket ships (AGRs), which had been converted from Liberty-type cargo vessels between 1957 and 1959.

For almost two years, beginning in late 1954, WV-2 airborne early warning aircraft, which were just entering the Navy inventory, supplemented the DERs on the Contiguous Barrier. In mid-1956 these highly capable aircraft were shifted to more demanding duties on the newly established North Atlantic barrier. ZPG-2W and ZPG-3W airborne early warning airships flying out of Naval Air Station Lakehurst, New Jersey, were another part of the Navy air defense effort from 1954 to 1962. Assigned to the Inshore Barrier, they provided radar coverage in the area between the DERs on the Contiguous Barrier and the ground-based radars of the Inshore Barrier.[17]

The Atlantic extension of the DEW Line was designated the Atlantic Barrier, and Commander Barrier Force Atlantic (COMBARFORLANT) was established in July 1955 to control the ships and aircraft that would patrol it. COMBARFORLANT headquarters was located at U.S. Naval Station Argentia, Newfoundland, Canada, one of the bases acquired by the United States in 1941 under the Lend-Lease deal with the United Kingdom. COMBARFORLANT,

designated Commander Task Force 82 (CTF 82) in the CINCLANTFLT task organization, also served as Commander AEW Wing Atlantic (COMAEWINGLANT), providing the planes that conducted the airborne early warning patrols.[18]

Testing of the Atlantic Barrier began in 1956. That summer USS *Strickland* (DER 333) made the first radar picket patrol, and WV-2s began airborne early warning patrols. The Atlantic Barrier, which officially became operational on 2 July 1957, consisted of four radar picket stations at 250-nautical-mile intervals from Newfoundland to the Azores. Four WV-2s were kept in the air at all times conducting airborne early warning patrols. (Budget cuts later reduced the number of planes on patrol at any one time to two.) All air contacts detected by the DERs or WV-2s were reported to COMBARFORLANT for evaluation, which consisted of comparing the contact's track with the flight plans of civil aircraft expected to be in the area. Any electronic emissions that could be correlated with the contact were also used to help identify it. Unidentified air contacts were passed on to NORAD headquarters for further evaluation and a decision whether or not to scramble fighters to intercept it.[19]

Fidel Castro's seizure of power in 1959 soon raised new security issues for the United States. As Castro established closer relations with the Soviet Union, including extensive military cooperation, concerns arose that Soviet aircraft could threaten the United States from bases in Cuba. In April 1961, in the aftermath of the aborted invasion of Cuba at the Bay of Pigs, the Joint Chiefs of Staff directed NORAD to execute Operation SOUTHERN TIP, which established a radar picket station to monitor the airspace between Cuba and southern Florida.[20]

The SOUTHERN TIP station of the Atlantic Contiguous Barrier was located about a hundred nautical miles east of Key West, eighty nautical miles south of Miami, and ninety miles from the coast of Cuba. Both DERs and AGRs were used to patrol the SOUTHERN TIP station, which was well positioned to detect air contacts heading northward from Cuba toward Florida. Unidentified air contacts were reported to the CONAD Control Center Key West, Florida, code named "Brownstone."[21]

In mid-1961, additional Air Force long-range radar stations became operational, extending the eastern end of the DEW Line across Greenland. This covered a portion of the approaches being guarded by the Atlantic Barrier, but there was still a gap between the DEW Line and Nato's Allied Command Europe Early Warning System, the western end of which was in Scotland. The better to utilize the Navy barrier patrol forces, plans were made to disestablish the Atlantic Barrier on 1 July 1961 and replace it with a Greenland-Iceland-United Kingdom (GIUK) Early Warning Barrier. To control the new GIUK Barrier, COMBARFORLANT, at this time Rear Admiral Robert N. Moore, shifted his headquarters from Argentia to Keflavik, Iceland. Admiral Moore gave up command of AEWINGLANT in the move but gained additional responsibilities as Commander Iceland Defense Force and as Commander Nato Fleet Air Wing North Atlantic Sub-Area. A few days before the GIUK Barrier

was to become operational, however, the Air Force notified the Navy that its new radar stations in Greenland were not ready and that the Atlantic Barrier would have to remain in operation for another month. This caused pandemonium, as deployments to Keflavik were nearly complete, but the new COMAEWINGLANT was able to pull together sufficient resources to patrol the Atlantic Barrier for another month. Finally, on 1 August 1961, the GIUK Barrier became operational.[22]

From Keflavik, COMBARFORLANT controlled two airborne early warning patrol stations and two surface radar picket stations. The two airborne stations, one to the west and one to the east of Iceland, were patrolled by Navy WV-2s flying out of Keflavik. The airborne patrol in the Greenland-Iceland gap was filled about 70 percent of the time, at random intervals; the airborne patrol in the Iceland-U.K. gap was filled all the time. The two surface radar picket stations were located similarly, one to the west and one to the east of Iceland. Air contacts were reported to the COMBARFORLANT Operations Control Center for evaluation, and unidentified contacts were passed on to NORAD. WV-2 crews would also debrief at the Operations Control Center after each flight. In addition to patrolling the GIUK Barrier, the forces assigned to COMBARFORLANT participated in Navy, NORAD, and Nato exercises. COMBARFORLANT forces also supported the International Ice Patrol and frequently participated in search and rescue missions in the North Atlantic.[23]

The WV-2s were originally assigned to VW 11 and VW 15, both commissioned in 1955. Based at Patuxent River with the Airborne Early Warning Training Unit Atlantic, these two squadrons flew Contiguous Barrier patrols in 1955 and 1956. When testing of the Atlantic Barrier began in July 1956, the two squadrons began operating out of Argentia, which was much closer to the barrier.[24] The airborne early warning squadrons were very large, consisting of about five hundred enlisted personnel and a hundred officers. Each squadron had twelve complete flight crews of twenty-six men each. The remaining personnel provided maintenance and support on the ground. During the early 1960s, the Airborne Early Warning Training Unit Atlantic also supported the Project MERCURY Recovery Forces (Task Force 140), flying search missions out of Lajes in the Azores and Kindley Air Force Base in Bermuda.[25]

From August 1961 onward, COMAEWINGLANT was also designated Commander Argentia Barrier Group (COMBARARGENTIA), an operational commander reporting to COMBARFORLANT. Navy contingency plans designated COMBARARGENTIA to command the Argentia Sub-Air Antisubmarine Warfare (ASW) Barrier, consisting of submarines and maritime patrol aircraft, should it be activated during a period of increased threat to the United States. (This barrier was in fact activated during the Cuban missile crisis of 1962, but no Soviet submarines attempted to penetrate it.) COMBARARGENTIA aircraft

also participated regularly in Navy and joint exercises along the Atlantic seaboard, including the annual NORAD SKY SHIELD air defense exercises.[26]

The Pacific Barriers

The Pacific Contiguous Barrier stretched from Washington to central California. The barrier consisted of five radar picket stations, Stations 1, 3, 5, 7, and 9, about three hundred nautical miles off the coast. As on the East Coast, each picket station originally reported to an ADDC, but reporting assignments changed over the years with Air Force reorganizations. From 1959 on, Stations 1 and 3 reported to the ADDC at McChord Air Force Base in Washington, Stations 5 and 7 reported to the ADDC at Hamilton Air Force Base in northern California, and Station 9 reported to the ADDC at Norton Air Force Base in southern California.[27]

As on the Atlantic coast, the radar picket stations on the Pacific Contiguous Barrier were originally patrolled by DERs, the first DER patrol being made in 1955. The DERs began to withdraw from the Pacific Contiguous Barrier in June 1958; the last one departed in April 1959, leaving those picket stations to AGRs. Navy WV-2s also patrolled the Contiguous Barrier, until assigned to the Pacific DEW Line extension in 1957.[28]

The Pacific extension of the DEW Line, known as the Pacific Barrier, was initially established for training and testing on 1 July 1957, with only one and a half WV-2 patrols per day (and no DERs) on station. The Pacific Barrier became fully operational on 1 July 1958, originally along an arc from Midway Island in the central Pacific to Kodiak in the Aleutians. Due to the barrier's length, WV-2s patrolled the southern portion and DERs patrolled the north. There were five DER radar picket stations at two-hundred-nautical-mile intervals, with the northernmost station about sixty miles southwest of Kodiak. The WV-2 patrols overlapped the two southern DER stations. In April 1959 the northern end of the barrier was shifted westward from Kodiak to Umnak Island, due to improved Air Force ground radar coverage in the eastern Aleutians. Commander Barrier Force Pacific (COMBARFORPAC), at Barbers Point, Hawaii, commanded the ships and aircraft assigned to the Pacific Barrier. All air contacts detected by the DERs or WV-2s were reported to COMBARFORPAC for evaluation (comparison with civil aircraft flight plans and correlation with electronic intercepts). Unidentified air contacts were passed on to NORAD headquarters for further evaluation and a decision whether or not to scramble fighters.[29]

The first surface radar picket patrol on the Pacific Barrier was made by USS *Vance* (DER 387) in July 1958. Initially only three DERs were on station at a time, but by 1959 there were five DERs continually on patrol. The nine DERs of Escort Squadron 7 (CORTRON 7) patrolled the barrier from 1958 to 1960, when the squadron was disestablished. Seven DERs of CORTRON 5 transferred from Seattle to Pearl Harbor between June 1958 and April 1959, participating in barrier patrols through 1965.[30]

When operational planning for airborne early warning patrols began in 1953, the Navy had one airborne early warning squadron in the Pacific: VW 1, based at Barbers Point and operating a detachment out of Naval Air Station Sangley Point, in the Philippines. VW 1 was primarily a training squadron for WV-1 (and later WV-2) crews, but it also supported fleet operations in the Pacific. VW 1 participated in initial testing of the Pacific Barrier in 1956 and 1957, then transferred to Naval Air Station Agana, on Guam, when additional airborne early warning squadrons arrived at Barbers Point.

Commander Airborne Early Warning Wing Pacific (COMAEWINGPAC), at Barbers Point, was established in January 1956. Over the next eleven months VW 12, VW 14, and VW 16 became operational at Barbers Point to patrol the Pacific Barrier. In 1961, VW 12 and VW 14 were merged into Airborne Early Warning Barrier Squadron Pacific (AEWBARRONPAC), which patrolled the barrier through 1965. Four or five WV-2s were on patrol at all times; flying out of Barbers Point, they would refuel at Midway Island before commencing their barrier patrols. From 1961, AEWBARRONPAC maintained a forward detachment on Midway, close to the southern end of the barrier.[31]

Aircraft and Airships

The Lockheed WV-2—with its distinctive aerodynamic fuselage, wingtip tanks, three vertical stabilizers, and four piston engines—was officially nicknamed the Warning Star, but the Navy crews who flew it called it the "Willie Victor." Originally the PO-2W, it was redesignated WV-2 in 1954 and EC-121K in 1962. The WV-2 had a length of some 116 feet, a wingspan of 123 feet, and a maximum gross weight of 70 tons. It had a maximum speed of 285 knots and a range of 3,850 miles. The WV-2 had two large radomes, one below the fuselage containing an APS-20 air search radar with a range of about 250 nautical miles, and one above the fuselage containing an APS-45 height-finding radar. Contact information from the radars and extensive electronic surveillance gear was fed into the plane's combat information center (CIC) for display on plotting boards and a dead-reckoning tracer.[32]

On the Atlantic Barrier, the WV-2s flew a two-hundred-mile-wide racetrack pattern between Newfoundland and the Azores, at an altitude of from five to twenty thousand feet, depending on the weather. A plane was launched every four hours for a patrol flight lasting about twelve hours. To ensure that a scheduled takeoff was not missed, a primary backup WV-2 was kept ready to launch in fifteen minutes, and a secondary backup in half an hour. The Willie Victor was one of the most demanding propeller-driven aircraft to maintain; its complex electrical and hydraulic systems required constant attention. According to Admiral Hyland, COMBARFORLANT in 1959–60, it took about nine WV-2s to keep one in the air. The Navy had purchased 142 of these planes.[33]

Argentia was infamous for its bleak weather—often foggy, rainy, or stormy—but Willie Victor pilots took great pride in their ability to get the big

birds into the air. If they could see far enough to taxi to the end of the runway, they took off. The weather over the North Atlantic was no better, demanding excellent flying skills and a dogged determination to complete the mission. When the visibility at Argentia fell "below minimums," divert airfields were available at Stevensville Air Force Base and the civilian airports at Gander and St. John's, all in Newfoundland. When the weather at Argentia was absolutely too bad to fly, Willie Victors would stage out of Lajes in the Azores, offering the aircrews a warm and sunny respite from Argentia.[34]

After the GIUK Barrier replaced the Atlantic Barrier, WV-2s would deploy to Keflavik for two weeks, typically logging about a hundred flight hours each during seven or eight arduous barrier patrols. They returned to Argentia for four weeks of aircraft maintenance, crew rest, and training. The weather in Keflavik was no better than in Argentia, but the pilots were well trained in foul-weather operations and rarely missed a mission for that reason. When conditions at Keflavik fell below minimums, the Willie Victors normally diverted to Prestwick, Scotland.[35] Captain John J. Coonan, commanding officer of VW 11 in 1962–63, has described a unique advantage that Keflavik had for coping with the foul winter weather.

> In spite of the atrocious weather conditions that existed in that northern region, the surveillance flights were essentially routine. The conditions that existed during the winter months injected major difficulties. . . . I do believe that the actual maintenance of the aircraft, the pre- and post-flight checks, the taxiing, takeoffs and landings were so greatly influenced by the unique hangars from which we operated that the item deserves mention. Why is this so? Well, unlike any flight operations that I have ever been associated with, we were able to board our aircraft and turn up the aircraft's engines *inside* the hangar, then taxi for takeoff and repeat this process in reverse—all without getting our feet wet or cold. This certainly immeasurably aided us in meeting our flight schedule. We could receive our taxi and flight clearances while still in the hangar and then move out without delay and get airborne—before our aircraft's wings could be seriously endangered by an accumulation of ice. Only occasionally were we required to come back to the hangar for deicing treatment prior to takeoff.[36]

On an airborne early warning mission the WV-2 carried a total of twenty-seven men: a patrol plane commander and two pilots; two Naval Aviation Observer (Navigation) officers as navigators and two Naval Aviation Observer (Controller) officers as CIC officers; two flight engineers; twelve air controlmen (of the AC rating) to operate radars, plot contacts in CIC, and control intercept aircraft; two electronic warfare systems operators and two radio operators; and two electronics technicians (ATs) to service radars and radios. The complement of each aircraft was divided into two crews, which rotated every three to four hours; within each crew, radar and sensor operators were rotated every forty-five minutes to keep them alert. The CIC team tracked and

attempted to identify air and surface contacts, and it could control fighters to intercept potentially hostile aircraft. The primary means of reporting contacts was high-frequency (HF) manual Morse radio. The WV-2 also had HF and ultrahigh-frequency (UHF) voice radio for communications with shore stations, aircraft (including interceptors under their control), and ships (particularly the DERs in picket stations on the barriers). Electronic intelligence collection was an important collateral mission on every flight.[37]

Barrier patrol flights lasted twelve hours, and they were, in Admiral Hyland's words, usually "boring, tiring, and repetitive."[38] Hyland describes the challenge that tedium presented:

> The major difficulty with this assignment was keeping an alert attitude and morale up during such a routine operation—back and forth, back and forth. I used competitive exercises, running unannounced tests, and various schemes of one sort or another to establish that the barrier was, in fact, alert and effective. And in all cases when these tests were run, it was very gratifying to see that these youngsters were on the ball.[39]

To ensure the proficiency of the CIC teams, the squadrons periodically sent highly experienced personnel along to evaluate them. COMBARFORLANT presented an Outstanding Crew Award every six months and a Meritorious Squadron Award annually.[40]

On the GIUK Barrier Patrol, WV-2 electronic surveillance led to occasional detections of Soviet submarines attempting to penetrate the Greenland-Iceland gap by skirting the edge of the Greenland ice pack. For this reason, beginning in 1963 the WV-2s were fitted by the Martin Corporation with a sonobuoy launcher and Jezebel-type sonobuoy receiver, which gave them a modest ASW capability. The launcher was mounted in the cabin by the after crew hatch. To launch sonobuoys, the hatch had to be opened, a safety net put up, and the launcher swung into place—an awkward process in the best of weather.[41]

Willie Victors were supplemented by the ZPG-2W and ZPG-3W blimps of Airship Airborne Early Warning Squadron 1 (ZW 1), flying out of Lakehurst. The airships normally patrolled Station 6 of the Atlantic Inshore Barrier, off the northeast coast of New Jersey, every other day. Like the WV-2s, the airships were equipped with a complete CIC, including radar operators and air intercept controllers.[42]

The Navy had purchased five nonrigid airships from Goodyear in 1954 for the airborne early warning mission. Originally ZP2N-1Ws, they were redesignated ZPG-2W in 1954 and EZ-1B in 1962. The ZPG-2W was equipped with an APS-20 air search radar inside the gas envelope and an APS-69 height-finding radar mounted on top of it. It carried a crew of twenty-one and had an endurance of over two hundred hours. In 1956, the Navy ordered four ZPG-3W (EZ-1C as of 1962) airships from Goodyear; they began flying barrier patrols from

Lakehurst in December 1959. Slightly larger than its predecessor, the 404-foot-long ZPG-3W was the last airship delivered to the Navy.[43]

The airship patrol was hampered from its inception by limited funding, which restricted flight hours and the availability of aircraft for air intercept controller training. At one point ZW 1 was restricted to a hundred flight hours per month, a paltry amount considering a single airship's endurance. In July 1959, CINCNORAD requested that the Navy move ZW 1 to San Diego to provide better radar coverage for southern California, but the Navy declined, due to the absence of airship facilities in San Diego and lack of funds to construct them. In June 1960 a ZPG-3W crashed when the gas envelope collapsed in flight, and on 31 October 1961 the Navy's last airship units were decommissioned. Two ZPG-3Ws that had been kept at Lakehurst for research were retired when the Navy terminated its airship program on 31 August 1962.[44]

Among the fighters available to respond to unidentified barrier contacts were the Navy aircraft of VF(AW) 3, an all-weather interceptor squadron based at North Island. VF(AW) 3 flew the Douglas F3D-1 Skyknight from 1955, when the squadron was first placed under Air Force control, until 1959. The F3D, the Navy's first all-weather jet interceptor, had entered operational service in 1951 and by the mid-1950s was rapidly approaching obsolescence. In 1957 VF(AW) 3 began transitioning to the Douglas F4D Skyray, receiving its first six that year. When the transition was complete, the squadron had twenty-five F4Ds. These Ed Heinemann–designed fighters were intended to operate as very fast, short-range interceptors.[45]

Assigned to the Air Force's 27th Air Division at Norton Air Force Base in San Bernardino, the F4Ds of VF(AW) 3 were controlled by the Air Force early warning radar site on Mount Laguna, code named "Anderson." In the late 1950s the squadron averaged one or two actual scrambles and two or three training scrambles per day. VF(AW) 3 consistently outperformed Air Force interceptor squadrons in scramble time and intercept effectiveness. The squadron also maintained an excellent safety record and superb aircraft-readiness rates—benefiting from the proximity of the Douglas factory, about a hundred miles away, and a first-rate factory representative. Although frequent scrambles added some excitement, one F4D pilot with VF(AW) 3 in the early 1960s described the squadron's existence as "a somewhat boring life of intercepting errant airliners," a life made fun and interesting only by the antics of the outstanding pilots. The air defense mission gave VF(AW) 3 appeal with the public, although residents near North Island were wont to complain about the noise of F4D afterburners.[46]

When unidentified air contacts were detected approaching the southern California coast, "Anderson" would sound the scramble alarm at North Island. With afterburners blazing, a pair of delta-winged F4Ds would thunder into the sky, rattling the windows of homes in Coronado. VF(AW) 3 routinely got a pair of F4Ds into the air three minutes after the klaxon sounded. In an emergency,

all twenty-five F4Ds could be in the air in less than two hours. Vectored to within thirty miles of the contact by Mount Laguna, F4Ds completed intercepts using their onboard radar, attempting to identify the contact without its being aware of their presence.[47]

Fidel Castro's embrace of the Soviet Union and his military buildup created a new mission for VF(AW) 3. In 1961 it began deploying a detachment of six F4Ds to Naval Air Station Boca Chica in Key West to augment air defenses in southern Florida and familiarize pilots with operations between Florida and Cuban airspace. VF(AW) 3 planes operated under Air Force control while in Key West as well. In January 1962, responding to Soviet delivery of MiG-21 jet fighters to Cuba, CONAD increased the readiness of the VF(AW) 3 Key West detachment to four F4Ds on five-minute alert at all times. The deployments lasted eight weeks and were popular with the pilots.[48] When on 14 October 1962 an Air Force U-2 photographed Soviet medium-range ballistic missiles in Cuba, launching the Cuban missile crisis, VF(AW) 3 had eight F4Ds in Key West.[49]

Radar Picket Ships

The Navy had learned, as we have noted, the value of radar picket ships during the last year of World War II, when destroyers equipped with air search radars had provided invaluable early warning of Japanese air attacks. Fast, heavily armed destroyers had been needed to escort the attack carrier task groups, which were always the first to sail in harm's way, but smaller, more economical ships could be used as radar pickets for slower amphibious and replenishment groups. Design studies for the radar picket destroyer escort (DER) were begun in the last year of the war. Seven *Buckley*-class destroyer escorts (DEs) were converted to DERs in 1945, but by 1947 six had been decommissioned and the seventh relegated to reserve training duties. Although they were in commission for only a short time during the war, these ships had proved the radar picket destroyer escort to be an efficient and effective type.[50]

The Navy decided it needed DERs again in 1949, when it was tasked to guard the seaward approaches to the northeastern United States as part of the limited LASHUP air defense system established in 1948. Rather than recommission the *Buckley*-class DERs, whose World War II–vintage electronics suites were now obsolete, the Navy decided to convert mothballed *Edsall*-class DEs, whose diesel engines gave them twice the endurance of the steam-powered *Buckleys*. The *Edsall* class had originally been commissioned in 1943–44 and placed in mothballs after the war. Six of these DEs were recommissioned and converted to DERs between February 1951 and June 1952; the first was USS *Harveson* (DER 316), on 12 February 1951. Homeported in Newport, Rhode Island, these were the only DERs available to patrol the Contiguous Barriers when they were established in 1954. Responding to the greatly expanded air defense mission, the Navy converted twenty-eight more *Edsalls* and two DEs of the *John C. Butler* class to DERs

between January 1955 and December 1957. By 1957, thirty-six DERs were in commission.[51]

The *Edsall* DER conversion consisted of adding an SPS-6 long-range air search radar, an SPS-8 height-finding radar, an SPS-4 surface search radar modified for "zenith search" (directly above the ship), IFF (identification friend or foe) equipment, an aircraft homing beacon, electronic surveillance systems, and additional communications. Later upgrades replaced the SPS-6 air search radar with the SPS-12, thereafter the SPS-28; the SPS-8 height-finding radar with the improved SPS-8B; the SPS-4 surface and zenith search radar with the SPS-10 surface search radar; and the aircraft homing beacon with TACAN (tactical air navigation). The *Edsall* DERs carried a crew of 150 men, and their diesel engines gave them tremendous endurance, an operating range of 11,500 nautical miles at eleven knots. The design was not without problems: the DERs were crowded, difficult to steer at speeds below eight knots, and had very little reserve buoyancy (for stability in a flooded condition). However, these limitations did not detract from the outstanding operational performance of the DERs, which provided significant capability in an economical package.[52]

The two *John C. Butler*–class DERs, USS *Wagner* (DER 539) and USS *Vandivier* (DER 540), were commissioned to test a plan for converting mothballed *Butler*-class DEs—over seventy of which were available—to DERs in the event of wartime mobilization. They were about the same size as the *Edsall* class and were reequipped with similar radar and electronics. The major difference between the two classes was that the *Butlers* were propelled by steam, limiting their endurance to 5,500 nautical miles at twelve knots. For this reason they were the first DERs to be decommissioned, in 1960.[53]

The DERs were organized into four escort squadrons, two on each coast. In the Atlantic Fleet, CORTRONs 16 and 18 were homeported in Newport. They patrolled the Atlantic Contiguous Barrier from 1954 until relieved of that duty by the AGRs in the late 1950s. These DERs patrolled the Atlantic Barrier from July 1956 until July 1961, and the GIUK Barrier from August 1961 to September 1965. They also patrolled the SOUTHERN TIP station from April 1961 to June 1965. A total of twenty-two DERs served in the Atlantic, although the maximum number in Newport at any one time peaked at nineteen, in July 1957. Atlantic Fleet DER strength declined to seventeen in 1957, due to transfers to the Pacific Fleet, and it remained at that level for almost three years. The next decline occurred in 1960, when nine Newport DERs were decommissioned as part of Navywide cost cutting. In January 1962, the remaining eight DERs were consolidated into CORTRON 16, and CORTRON 18 was disestablished.

The first four DERs to join the Pacific Fleet arrived in July through November 1955. They were assigned to CORTRON 5, homeported in Seattle, Washington, and patrolled the Pacific Contiguous Barrier. Subsequent additions raised CORTRON 5 to a high of nine DERs, in 1957. The first two DERs to be homeported in Pearl Harbor arrived in June 1957; by the spring of 1958, there were ten DERs there. Assigned to CORTRON 7, their mission was to patrol

the Pacific Barrier when it became operational in July 1958. Between June 1958 and April 1959, CORTRON 5 and seven of its DERs were transferred to Pearl Harbor for the Pacific Barrier, and AGRs took over Contiguous Barrier patrols. This raised the number of DERs in Pearl Harbor to its peak, seventeen. In 1960, six Pearl Harbor DERs were decommissioned, one was transferred to Guam, and one was transferred to San Francisco to serve as a training ship. CORTRON 7 was disestablisbed in 1960, and the remaining nine DERs went to CORTRON 5.[54]

DER employment patterns varied widely between the barriers. Atlantic Barrier patrols lasted three to four weeks, with ships on the northern stations making stops in Argentia for fuel. GIUK Barrier patrols were from two to four months in length. DERs en route to and from the GIUK Barrier often stopped in Argentia for fuel; they maintained a cycle of about two weeks on patrol followed by about two weeks in Greenock, Scotland, for upkeep, stores, and fuel. SOUTHERN TIP patrols varied widely in length. Sometimes DERs would transit directly to Cay Sal Bank for a two-week patrol and then steam straight back to Newport; others would operate out of Key West for up to three months, mixing SOUTHERN TIP patrols with other duties and making recreational port visits to Fort Lauderdale and Miami, which were popular with the crews. Pacific Barrier patrols normally lasted about six weeks but could last as long as two months. DERs on the Pacific Barrier regularly stopped at Midway for fuel before heading north to their patrol stations, and they made stops in Alaskan ports for fuel, supplies, and crew rest.[55]

The DERs in the radar picket stations performed several functions. Their primary mission was early warning of air contacts approaching the North American continent; COMBARFORLANT awarded the Constant Vigilance Award semiannually for outstanding operational proficiency on Atlantic Barrier and GIUK Barrier patrols. The second mission of the barrier ships was surface and antisubmarine surveillance. In the Atlantic, surface and submarine contacts were reported to Commander ASW Force Atlantic, in Norfolk, Virginia. The radar pickets also reported weather conditions at their stations, provided navigational aid to civilian airliners, and assisted in search and rescue efforts. Ships on the SOUTHERN TIP station routinely encountered Cuban refugees, providing them with water, food, and fuel when they needed assistance and occasionally rescuing them from foundering craft.[56]

Barrier patrols were lonely and wearing. Admiral Hyland has said of the DERs on the Atlantic Barrier, "It was those people in the seaborne part of the barrier that really had some rough weather to go through. In the middle of winter in the North Atlantic, there isn't a more difficult or unpleasant place to be."[57] In February 1962, while patrolling the GIUK Barrier, USS *Roy O. Hale* (DER 336) was caught in a fierce storm that injured thirteen crewmen, two seriously, destroyed the forward three-inch gun mount and the hedgehog (ASW rocket-propelled depth charge) launcher, tore away the motor whaleboat, and severely damaged the bridge. After three weeks in Greenock for repairs, *Roy O. Hale*

resumed patrol duties. The weather on the Pacific Barrier was little better, particularly in winter. The DERs did not carry doctors, so crew members suffering medical emergencies beyond the skills of the ships' enlisted hospital corpsmen had to be evacuated ashore. This was not difficult on the Contiguous Barriers, because U.S. ports were fairly close. On the Atlantic and GIUK Barriers, it meant evacuating personnel (by helicopter when available and weather permitted) to Argentia, Lajes, Keflavik, or other ports; on the Pacific Barrier, it normally required evacuation to Adak.[58]

Several Atlantic Fleet DERs participated in the 1962 Cuban missile crisis. The SOUTHERN TIP station was manned continuously, with three DERs rotating through that assignment during the crisis. On 22 October, a Navy P-2 Neptune patrol aircraft sighted the Soviet submarine replenishment ship *Terek* refueling a Soviet Zulu-class submarine about six hundred miles northwest of the Azores. USS *Mills* (DER 383), en route to Greenock to commence a GIUK Barrier patrol, was diverted on 23 October to trail *Terek*. *Mills* was relieved by USS *Calcaterra* (DER 390) on 1 November.[59] DERs were also assigned to the Florida Strait Patrol (Task Unit 81.6.1), which was established on 23 October to protect Key West military installations and U.S. and friendly shipping from harassment or attacks by Cuban air and surface forces. In the aftermath of the crisis, when there was still great concern about Soviet arms shipments to Cuba, DERs were among the ships tasked to maintain close surveillance of Soviet bloc shipping. They patrolled the Florida Strait during the first six months of 1963.[60]

The *Guardian*-class AGRs were converted from Liberty ships between 1957 and 1959 at the Philadelphia, Norfolk, Portsmouth, and Charleston Naval Shipyards. They were 441 feet in length, displaced 10,750 tons fully loaded, and were the last ships in the Navy to have triple-expansion, reciprocating steam engines. Originally designated YAGRs (ocean radar station ships), they were redesignated AGRs (radar picket ships) in September 1958. Equipped with the large AN/SPS-17 long-range air search radar, height-finding radar, TACAN, electronic surveillance systems, and extensive communications equipment, the AGRs had a crew of from thirteen to twenty officers and 138 to 150 enlisted men, under a lieutenant commander. A large combat information center contained radar repeaters, large vertical plotting boards, and dead-reckoning tracers for tracking contacts and controlling interceptors. Their only armament was two Mark 22 three-inch antiaircraft guns and .50-caliber machine guns. The large size of the AGRs enabled them to offer comfortable accommodations: one or two–officer staterooms, three or four–man chief petty officer compartments, large enlisted berthing spaces, an enlisted dining area that could seat half the crew at a sitting, and ample space for recreational activities.[61]

The sixteen AGRs were divided equally between Atlantic and Pacific. Radar Surveillance Squadron 2 (RADRON 2) patrolled the Atlantic Contiguous Barrier and the SOUTHERN TIP station. Originally homeported in Newport,

RADRON 2 shifted in September 1958 to Davisville, Rhode Island, on the western side of Narragansett Bay. In the Pacific, Radar Surveillance Squadron 1 (RADRON 1), based in San Francisco, patrolled the Pacific Contiguous Barrier.[62]

Atlantic Contiguous Barrier patrols normally lasted three to four weeks; Pacific Contiguous Barrier patrols were slightly longer, four to five weeks. Inport periods between patrols were normally three or four weeks long, and the AGRs spent up to two hundred days per year under way. Like the DERs, the AGRs did not carry doctors, so medical emergencies had to be evacuated ashore. U.S. ports were nearby, but the slow speed of the AGRs sometimes delayed arrival within helicopter range of shore. The weather was no better for the AGRs than it was for the DERs. One writer has described the "stark and often ferocious waters" in which the AGRs patrolled:

> Bad weather and sea conditions were the rule rather than the exception for the AGRs. The storms of the North Atlantic and North Pacific sometimes brought winds of 70 to 80 knots and seas of 40 to 50 feet in height. In the North Atlantic, the winter season brought temperatures below freezing; ocean spray whipping across the ships could, and often did, coat them inches deep in ice. In the spring and early summer, the additional hazard of icebergs and growlers were [*sic*] often a distinct possibility.[63]

When on radar picket patrol, the AGRs operated under CONAD control and reported unidentified air contacts to the air defense direction center designated for their picket station. The AGRs occasionally made radar picket patrols off the east and west coasts of Canada and participated in exercises with Canadian naval and air defense forces. U.S. Air Force air intercept control officers were embarked regularly for familiarization and cross training. AGRs were also tasked with weather reporting and search and rescue duties, and they took part in Atlantic and Pacific Fleet ASW exercises.[64]

Mission Complete

The "bomber gap" controversy was put to rest by 1957. Photographic intelligence on Soviet bomber production collected by high-flying U-2 reconnaissance aircraft revealed that the Soviets were not rapidly building a fleet of long-range bombers; in fact, because of accelerated B-52 production the United States actually held the lead.[65] The "bomber gap" crisis faded away, but a new one arose. On 4 October 1957, the Soviet Union launched the Sputnik satellite into orbit, causing a shock in the United States that made the "bomber gap" sensation seem trivial. Sputnik, the Soviet missile test program, and Moscow's boasting about their missile prowess created fears in the United States that the Soviets had gained a significant lead in fielding long-range missiles. This

supposed "missile gap" became the primary concern in U.S. defense planning as well as in the American political arena.

By 1965, improvements in Air Force shore-based air surveillance radars, in conjunction with accurate and reassuring intelligence on the Soviet bomber threat, had eliminated the need for an active Navy role in continental air defense. The Navy moved quickly to dismantle the extensive force structure it had assembled to carry out the mission. VF(AW) 3 had already been decommissioned, in 1963. On 15 April 1965, USS *Newell* (DER 322) commenced the last radar picket patrol on the Pacific Barrier, and on 1 May its crew marked the disestablishment of the barrier in a ceremony at Midway Island. The Atlantic and Pacific Contiguous Barriers were shut down on 30 June 1965. COMBARFORLANT stood down, and the GIUK Barrier was disestablished on 1 September 1965. With no mission to perform, COMAEWINGLANT, COMAEWINGPAC, and the Navy's last three shore-based airborne early warning squadrons (VW 11, VW 13, and AEWBARRONPAC) were decommissioned in 1965. The last COMNAVFORCONAD closed up shop in Colorado on 1 September 1965, ending the Navy's formal role in the joint continental air defense mission.[66]

With the cancellation of the Contiguous Barriers in June 1965, the AGRs were no longer needed; RADRONs 1 and 2 were disestablished in August. The *Guardian*-class AGRs were all decommissioned in 1965 and placed in mothballs in the Atlantic and Pacific National Defense Reserve Fleets. They remained in mothballs until sold for scrap in the early 1970s.[67]

At the beginning of 1965, nineteen DERs remained in commission: six in Newport patrolling the GIUK Barrier, nine in Pearl Harbor for the Pacific Barrier, one in Guam patrolling the Marianas Islands, and two in Seattle and one in San Francisco serving as training ships. As the barrier patrol mission was winding down, a new mission was arising for these ships—Operation MARKET TIME was launched on 11 March 1965 to interdict North Vietnamese arms shipments through the South China Sea. DERs were perfect for MARKET TIME, due to their economy, tremendous endurance, and small size; in the spring of 1965, *Vance* became the first DER to make a MARKET TIME patrol.[68]

The Impact of the Barriers

The importance and necessity of the radar barriers have been questioned. Even while commanding BARFORLANT, Admiral Hyland believed that the barrier patrols were unnecessary and ate up resources needed for other missions.[69] On the other hand, the barriers, which denied the option of a surprise nuclear bomber strike on the Atlantic or Pacific coasts, had to be included in Soviet strategic calculations. Soviet electronic intelligence collection ships (AGIs) were in the North Atlantic monitoring the ships and aircraft on the Atlantic and GIUK Barriers;[70] the Pacific Barrier was also probed by AGIs. The Soviet high command was therefore well aware that the U.S. Navy had erected a radar barrier across the oceanic approaches to North America.

A look at Soviet strategic nuclear forces in October 1962 shows the impact that the barriers had on Soviet strategic calculations. During the Cuban missile crisis—arguably the closest the United States and the Soviet Union ever came to nuclear war—the Soviet missile force capable of reaching the United States consisted of some forty-four to seventy-five intercontinental ballistic missiles (of which Russian sources now state only twenty were fully operational), about a hundred submarine-launched ballistic missiles (none of them deployed within firing range of the United States), and forty-two medium-range ballistic missiles in Cuba (for which, Russian records indicate, only twenty nuclear warheads had been delivered to Cuba). The Soviets thus had a total of only forty fully operational nuclear-armed missiles capable of reaching the United States. In contrast, the Soviet Union possessed about 155 long-range bombers capable of delivering nuclear weapons against the United States.[71] The Soviet high command, however, knew that its bombers—over three-quarters of its ready strategic nuclear force—could not reach the United States by any route without being detected by U.S. early warning radars and intercepted by air defense forces. That knowledge undoubtedly reinforced the deterrent effect of American nuclear superiority, strengthening President John F. Kennedy's hand against Nikita Khrushchev's bluster and bluffs.

We Have Been There Before

Navy participation in the continental air defense mission is a striking example of joint operations. To it the Navy could contribute state-of-the-art radar picket ships and airborne early warning aircraft, as well as significant air defense experience. Some Navy forces were placed under Air Force control, like VF(AW) 3 and units assigned to the Contiguous Barriers. Navy forces patrolling the Atlantic and Pacific Barriers remained under Navy control but were integrated into the Air Force air surveillance reporting network. For eleven years the Navy maintained a vigilant watch over the seaward approaches to the United States as part of the joint air defense team.

The Navy's experience with continental air defense offers lessons worth keeping in mind as the prospect of another homeland defense mission looms on the horizon: sea-based national missile defense (NMD). As was the case in the 1950s, when technology originally developed to meet fleet-defense requirements proved valuable for defending the nation, the Navy's ballistic missile defense program could well provide a foundation for Navy participation in national missile defense. The debate on whether to deploy NMD and on whether NMD deployment should include a sea-based component has focused on threats, technological feasibility, and the desirability of continued adherence to the Anti–Ballistic Missile Treaty, but there are additional considerations as well.

In the 1950s and 1960s, the Navy was never enthusiastic about the continental air defense mission, which it viewed as diverting scarce resources from its

primary missions of sea control and power projection. The Navy's strategic concept today may not exclude a homeland defense mission, but it certainly does not accord one high priority. Resource constraints are at least as severe today as they were forty years ago, if not worse, making it likely that NMD would divert funds and forces from other Navy missions—or at least be perceived as doing so. Unlike the 1950s, when the Navy had a fleet of economical vessels in mothballs that it could reactivate for the continental air defense mission, modern sea-based NMD would require our most modern and capable surface combatants. Putting those ships in picket stations off the coasts to perform a single, static mission would not be taking advantage of their mobility and robust, multimission capabilities—which could be badly needed off the shore of a rogue nation abroad.

Theater missile defense (TMD) capabilities also could be problematic in this regard, due to the possibility that TMD-capable combatants would be designated as theater commander-in-chief or even national assets, in which capacity their movements and employment would be dictated by higher authority rather than by the battle group commander—as sometimes happens with Tomahawk-capable combatants today. If the Navy is assigned the NMD mission, so be it. But as we contemplate the prospect of a new homeland defense mission, let us remember that we have been there before, and we did not like it—for reasons that still apply today.

Notes

1. David A. Anderson, "Pictures Reveal Reds' New 'Sunday Punch,'" *Aviation Week*, 15 February 1954, pp. 12–3.

2. "Congress Gets Red Plane Facts," *Aviation Week*, 22 February 1954, pp. 13–4; Katherine Johnsen, "Twining Warns of Red Jet Striking Power," *Aviation Week*, 22 March 1954, p. 10; Robert Hotz, "Russian Jet Airpower Gains Fast on U.S.," *Aviation Week*, 23 May 1955, pp. 12–5; "Aviation Week Story Spurs Debate on U.S., Red Airpower Positions," *Aviation Week*, 30 May 1955, pp. 13–4; and Claude Witz, "USAF Recognizes Red Gains, Spurs B-52," *Aviation Week*, 6 June 1955, pp. 12–3. Also see John Prados, *The Soviet Estimate* (Princeton, N.J.: Princeton Univ. Press, 1982), pp. 38–45; and George E. Lowe, *The Age of Deterrence* (Boston: Little, Brown, 1964), pp. 121–3.

3. Joseph T. Jockel, *No Boundaries Upstairs* (Vancouver: Univ. of British Columbia Press, 1987), pp. 32–90; James Meikle Eglin, *Air Defense in the Nuclear Age* (New York: Garland, 1988), pp. 60–4, 70–5; and Glenn H. Snyder, "The 'New Look' of 1953," in Warner R. Schilling, Paul Y. Hammond, and Glenn H. Snyder, eds., *Strategy, Politics and Defense Budgets* (New York: Columbia Univ. Press, 1962), pp. 420–1.

4. Jockel, pp. 90–110; and Eglin, pp. 165–8.

5. John Monsarrat, *Angel on the Yardarm: The Beginnings of Fleet Radar Defense and the Kamikaze Threat* (Newport, R.I.: Naval War College Press, 1985), pp. 156–8; Norman Friedman, *Naval Radar* (Greenwich, U.K.: Conway Maritime Press, 1981), pp. 99–100, 228–9; and Scott A. Thompson, *B-17 in Blue* (Elk Grove, Calif.: Aero Vintage Books, 1993), pp. 1–7.

6. Thompson, pp. 5–15; Gordon Swanborough and Peter M. Bowers, *United States Navy Aircraft since 1911* (Annapolis, Md.: Naval Institute Press, 1990), p. 79; "Strangest Shape in the Sky," *Naval Aviation News*, May 1958, p. 9; and Harold S. Durfee [LCdr., USN (Ret.)], a PB-1W pilot in VX 4 (1947–49), a WV-2 patrol plane commander in VW 11 (1959–61), and Director of Training in the AEW Training Unit Atlantic (1961–63), letter to author, 5 November 1992.

7. Thompson, pp. 15–25; Swanborough and Bowers, pp. 79, 299–300; "Strangest Shape in the Sky," p. 9; and Durfee, letter to author.

8. Norman Friedman, *U.S. Destroyers: An Illustrated Design History* (Annapolis, Md.: Naval Institute Press, 1982), p. 229; Naval Historical Center, *Dictionary of American Naval Fighting Ships* [hereafter *DANFS*], vol. 3

(Washington, D.C.: U.S. Govt. Print. Off., 1968), p. 64; Swanborough and Bowers, pp. 79, 299; and Durfee, letter to author.

9. John J. Hyland [Adm., USN (Ret.)], "Barrier Patrol," *Naval History*, Fall 1989, p. 58.

10. Commander Naval Forces Continental Air Defense Command, "History, Naval Forces Continental Air Defense Command, 1 July–31 December 1957" [hereafter COMNAVFORCONAD 1957 History], n.d., Operational Archives, Naval Historical Center, Washington, D.C., p., 4; and Hyland, pp. 58–9.

11. COMNAVFORCONAD 1957 History, pp. 2–5; Hyland, pp. 58–9; and Eglin, pp. 139, 142.

12. Commander Naval Forces Continental Air Defense Command, "Command History, 1 July 1960–1 January 1961," March 1961, Operational Archives, Naval Historical Center, Washington, D.C.

13. The first COMNAVFORCONAD was Rear Admiral Albert K. Morehouse. Dr. Thomas Fuller, U.S. Air Force Space Command historian, conversation with author, 14 January 1992.

14. COMNAVFORCONAD 1957 History; George VandeWater, F4D pilot assigned to VF(AW) 3 in 1961–63, letters to author, 6 September 1992 and 30 October 1992; Robert L. Lawson, *The History of US Naval Air Power* (New York: Military Press, 1985), pp. 132–3; Carson M. Smith, "They Put the Pinch on Bogeys," *Naval Aviation News*, April 1959, pp. 22–3; Larry Booda, "U.S. Watches for Possible Cuban IRBMs," *Aviation Week and Space Technology*, 1 October 1962, p. 20; "Pentagon Civil-Military Friction Increases," *Aviation Week and Space Technology*, 15 October 1962, p. 26; "U.S. Moves Jets near Cuba," (Charleston, S.C.) *News and Courier*, 19 October 1962, p. 3; and Fuller, conversation with author.

15. COMNAVFORCONAD 1957 History.

16. Station 12 was east of Cape Cod; Station 14 was east of Atlantic City, New Jersey; Station 16 east of Chincoteague Inlet, Maryland; Station 18 east of the Virginia–North Carolina border; and Station 20 east of Cape Lookout, North Carolina. Ibid.; Commander, Naval Forces Continental Air Defense Command, "Command History, 1 July 1959–31 December 1959" [hereafter COMNAVFORCONAD 1959 History], 29 February 1960, Operational Archives, Naval Historical Center, Washington, D.C.; Commander Naval Forces Continental Air Defense Command, "Command History, 1 January 1961–1 July 1961" [hereafter COMNAVFORCONAD 1961 History], 11 September 1961, Operational Archives, Naval Historical Center, Washington, D.C.

17. COMNAVFORCONAD 1957 History; Commander Naval Forces Continental Air Defense Command, "Command History, 1 January 1960–1 July 1960" [hereafter COMNAVFORCONAD 1960 History], 3 September 1960, Operational Archives, Naval Historical Center, Washington, D.C.; and Swanborough and Bowers, pp. 299–301, 580–1.

18. COMNAVFORCONAD 1957 History.

19. Ibid. *DANFS*, vol. 4, p. 361; and vol. 6, p. 654. Hyland, pp. 58–9; and Durfee, letter to author, 5 November 1992.

20. COMNAVFORCONAD 1961 History.

21. The station was just north of the Cay Sal Bank, near the Dog Rocks. Ships assigned to the SOUTHERN TIP station would sometimes anchor at the Dog Rocks in good weather to conserve fuel—and the fishing wasn't bad, either. Ibid.; and *DANFS*, vol. 5, p. 394.

22. The new COMAEWINGLANT was Captain Leonard E. Harmon. COMNAVFORCONAD 1961 History; Commander Barrier Force Atlantic, "Command History 1 January–31 December 1962" [COMBARFORLANT 1962 History], 11 January 1963, Operational Archives, Naval Historical Center, Washington, D.C.; "Sitting on Top of the World," *Naval Aviation News*, August 1962, pp. 34–5; and Leonard E. Harmon [Capt., USN (Ret.)], COMAEWINGLANT in 1961–62, letter to author, 18 March 1993.

23. COMBARFORLANT 1962 History; Leo P. Zeola [Capt., USNR (Ret.)], WV-2 naval aviation observer (controller) and senior CIC officer in VW 11, 1962–64, tape-recorded oral history provided to author, 8 May 1993; and John J. Coonan [Capt., USN (Ret.)], commanding officer of VW 11 in 1962–63, letter to author, 18 March 1993.

24. Still permanently based at Patuxent River, they took turns making six-month deployments to Argentia for barrier patrol duties. A third airborne early warning squadron, VW 13, was commissioned in 1958, and the Navy undertook a permanent shift of VW 11 and VW 13 to Argentia; VW 11 was the first to move, in 1958. VW 15 was decommissioned on 15 April 1961, because only two airborne early warning squadrons were required to patrol the GIUK Barrier. Commander Naval Forces Continental Air Defense Command, "Command History, 1 January 1965–1 September 1965" [hereafter COMNAVFORCONAD 1965 History], 23 August 1965, Operational Archives, Naval Historical Center, Washington, D.C.; Airborne Early Warning Wing Atlantic, "Aviation Historical Summary, 1 October 1961–30 September 1962" [hereafter COMAEWINGLANT 1962 History], 22 October 1962, Operational Archives, Naval Historical Center, Washington, D.C.; Airborne Early Warning Wing Atlantic, "Aviation Historical Summary, 1 October 1962–30 September 1963" [hereafter COMAEWINGLANT 1963 History], 9 October 1963, Operational Archives, Naval Historical Center, Washington, D.C.; "Barrier Gets New Squadron," *Naval Aviation News*,

July 1958, p. 10; Zeola, recorded oral history, 8 May 1993; Durfee, letter to author; and Coonan, letter to author.

25. "Barrier Gets New Squadron"; Zeola, recorded oral history; Durfee, letter to author; and Coonan, letter to author.

26. COMAEWINGLANT 1962 History; and COMAEWINGLANT 1963 History.

27. Station 1 was west of Gray's Harbor, Washington; Station 3 was west of Newport, Washington; Station 5, west of Crescent City, Oregon; Station 7, west of Mendocino, California; and Station 9, west of Point Sur, California. COMNAVFORCONAD 1957, 1959, 1961 Histories.

28. COMNAVFORCONAD 1960 History.

29. Rear Admiral Benjamin E. Moore was the first COMBARFORPAC. COMNAVFORCONAD 1957 History.

30. Ibid.; and *DANFS*, vol. 7, p. 456.

31. VW 16 had been decommissioned in 1957, its aircraft consolidated in VW 12 and 14. COMNAVFORCONAD 1957 History; COMNAVFORCONAD 1959 History; Commander Naval Forces Continental Air Defense Command, "Command History, 1 January 1962–30 June 1962," 28 August 1962, Operational Archives, Naval Historical Center, Washington, D.C.; Office of the Chief of Naval Operations (OPNAV), "Naval Aeronautical Organization" (Washington, D.C.: Aviation History Branch, Naval Historical Center, annual editions, 1953–1966); and "AEW Guards the Pacific," *Naval Aviation News*, August 1958, pp. 12–3.

32. Swanborough and Bowers, pp. 299–301; Samuel L. Morison and John S. Rowe, *The Ships and Aircraft of the U.S. Fleet*, 10th ed. (Annapolis, Md.: Naval Institute Press, 1975), p. 176; W.R. Green, "Crew One, Best on the Barrier," *Naval Aviation News*, March 1963, pp. 22–5; Hyland, p. 58; and Durfee, letter to author.

33. Hyland, pp. 58–9; "Barrier Gets New Squadron," p. 10; Durfee, letter to author; Harmon, letter to author; and Morison and Rowe, p. 176.

34. Hyland, pp. 58–9; "Barrier Gets New Squadron," p. 10; and Durfee, letter to author.

35. Hyland, pp. 58–9; Green, pp. 22–5; Zeola, recorded oral history; and Coonan, letter to author.

36. Coonan, letter to author.

37. Green, pp. 22–5; Hyland, p. 58; Durfee, letter to author; Zeola, recorded oral history; Coonan, letter to author; and John B. Lukasiewicz, WV-2 radio operator assigned to AEWBARRONPAC in 1959–61, e-mail to author, 29 April 1999.

38. Hyland, p. 58.

39. Ibid.

40. Captain Leo P. Zeola, senior CIC officer of VW 11 in 1962–64, frequently flew on these check rides, deploying to Keflavik with the crew being evaluated. Zeola, recorded oral history; COMBARFORLANT 1962 History; and Green, pp. 22–5.

41. Zeola, recorded oral history.

42. COMNAVFORCONAD 1957, 1959 Histories.

43. COMNAVFORCONAD 1959 History; "World's Largest Non-Rigid Airship," *Naval Aviation News*, August 1959, p. 3; and Swanborough and Bowers, pp. 580–1.

44. COMNAVFORCONAD 1959 History; Swanborough and Bowers, pp. 580–1; and Lawson, p. 149.

45. Swanborough and Bowers, pp. 198–9; Smith, p. 22; Lawson, p. 132; and VandeWater, letter to author, 30 October 1992. Edward H. Heinemann (1908–1991) also designed the A-20, B-26, and the Mach-2 Skyrocket.

46. The pilot was Lieutenant George VandeWater. Smith, pp. 22–3; VandeWater, letter to author, 30 October 1992.

47. VandeWater, letter to author, 30 October 1992.

48. VandeWater, letters to author, 6 September 1992 and 30 October 1992; Commander 32d Continental Air Defense Region, radio message, date-time group 32 CONAD REGION OCAFS 200140Z JAN 62, dated 20 January 1962, Operational Archives, Naval Historical Center, Washington, D.C.

49. The pilots stood a twenty-four-hour alert and then had thirty-six hours off. Initially four planes were kept on five-minute alert, but this was later relaxed to two on five-minute alert and two to four on fifteen-minute alert. VF(AW) 3 also flew daily combat air patrols over the Florida Strait along the twenty-fourth parallel, which appeared to be the northern limit of Cuban MiG patrols. VandeWater (who took great pride in his ability to get from the ready room and start his takeoff roll in less than two minutes) states that he flew twenty-six missions during the crisis, including four scrambles on unidentified contacts—all four of which turned out to be Air Force B-47s. VF(AW) 3 pilots rarely picked up Cuban MiGs visually or on radar and never had cause to engage them—although they would have loved to prove their stuff in a dogfight with a MiG. VandeWater recalls, "I had a lot of confidence in the F4D. On the nights we flew along the twenty-fourth parallel with MiGs on the other side, I was certain that I could shoot them down and I think we could

have bested them in a dogfight in the daytime. . . . Of course, we fervently wished for some excuse to cross the line for a shot at them, since our F4Ds were great-performing little fighters in the subsonic-speed range, fully capable, I believed, of mixing it up with a MiG even in a turning fight." VandeWater, letter to author, 30 October 1992.

50. Raymond V. B. Blackman, ed., *Jane's Fighting Ships 1963–64* (London: *Jane's Fighting Ships*, 1963), p. 352; and Friedman, p. 228.

51. Friedman, pp. 229–33, 460–8; Blackman, pp. 353, 357. *DANFS*, vol. 3, pp. 265, 272, 334, 571, 657, 673, 676; vol. 4, pp. 56, 152, 361; vol. 5, pp. 76, 188, 308, 380; vol. 6, pp. 26, 92, 165, 365, 435, 654, 664; vol. 7, pp. 147, 456; and vol. 8, p. 309.

52. Friedman, pp. 229–33; and Blackman, p. 357.

53. Friedman, pp. 231–2; and Blackman, p. 352.

54. COMNAVFORCONAD 1957 History; Friedman, pp. 460–8. *DANFS*, vol. 3, pp. 265, 272, 571, 673; vol. 4, pp. 56, 152; vol. 5, p. 76; vol. 6, pp. 26, 365, 654, 664; vol. 7, p. 456; and vol. 8, p. 309.

55. James W. Hayes, Jr. [Capt., USN (Ret.)], commanding officer of USS *Roy O. Hale* (DER 336), in 1961–63, letter to author, 21 July 1992; Mrs. Walter B. Frick, widow of Commander Walter B. Frick, USN (Ret.), executive officer of USS *Mills* (DER 383) in 1961–63, letter to author, 2 November 1992; "The History of the *Roy O. Hale* as a Radar Ship (DER 336)," *USS Roy O. Hale News*, Winter 1990–91, p. 3. *DANFS*, vol. 3, pp. 334, 571, 673; vol. 4, p. 361; vol. 5, p. 76; vol. 6, pp. 26, 654, 664; vol. 7, pp. 147, 456; and vol. 8, p. 309.

56. Robert J. Bogle, operations officer of USS *Roy O. Hale* (DER 336) in 1962, letter to author, 20 April 1992; Everett A. Parke, "The Unique and Vital DER," U.S. Naval Institute *Proceedings*, February 1960, pp. 89–91; *DANFS*, vol. 3, p. 571; vol. 6, pp. 365, 435; and vol. 8, p. 309.

57. Hyland, p. 59.

58. Hayes, letter to author; Bogle, letter to author; Parke, p. 91; and William G. Schofield, *Destroyers: 60 Years* (New York: Rand McNally, 1962), pp. 175–89.

59. *Terek* held a southwesterly course with *Calcaterra* in trail and on 4 November, 750 miles east of Bermuda, was observed rigging to refuel a submarine. *Terek* and a Soviet Foxtrot-class submarine appeared to be closing for a rendezvous, but the presence of *Calcaterra* and U.S. Navy ASW forces apparently deterred the submarine from joining. Unable to carry out her mission, *Terek* turned back to the northeast and started home. *Roy O. Hale* relieved *Calcaterra* on 14 November and trailed *Terek* from the mid-Atlantic to the northern Norwegian Sea, ensuring that the Soviet ship did not refuel or reprovision submarines that could have interfered with the American quarantine of Cuba. Commander in Chief Atlantic, "CINCLANT Historical Account of Cuban Crisis 1962," 29 April 1963, Operational Archives, Naval Historical Center, Washington, D.C., pp. 121–4; Frick, letter to author; Hayes, letter to author; Bogle, letter to author; "The History of the *Roy O. Hale*" p. 3; Schofield, pp. 175–89; and *DANFS*, vol. 7, p. 147.

60. USS *Hissem* (DER 400), "Ship's History, 1962" (Washington, D.C.: Ship's History Division, Ships, Naval Historical Center, 8 January 1963); Donald L. Lassell [Capt., USN (Ret.)], Commander Destroyer Division 601 and Commander Florida Strait Patrol (CTU 81.6.2) during the Cuban missile crisis, letter to author, 11 May 1988. *DANFS*, vol. 3, pp. 334, 676; vol. 6, p. 92; and vol. 7, p. 147.

61. COMNAVFORCONAD 1957 History; Thomas Gallagan, "Lonely Vigil of the '*Guardians*,'" *Sea Classics*, December 1992, pp. 10–3, 123; and Blackman, p. 393.

62. *DANFS*, vol. 3, pp. 178, 444–5, 451; vol. 4, pp. 129, 141; vol. 5, pp. 191, 296, 394; vol. 6, pp. 375, 419, 530; vol. 7, pp. 254, 514; and vol. 8, p. 157. Gallagan, p. 10.

63. Gallagan, p. 13.

64. COMNAVFORCONAD 1957 History. *DANFS*, vol. 3, pp. 178, 444–5, 451; vol. 4, pp. 129, 141; vol. 5, pp. 191, 296, 394; vol. 6, pp. 374, 419, 530; vol. 7, pp. 254, 514; vol. 8, p. 157. Gallagan, pp. 10–3.

65. Michael R. Beschloss, *Mayday: Eisenhower, Khrushchev and the U-2 Affair* (New York: Harper and Row, 1986), pp. 149–50, 366; Dino A. Brugioni, *Eyeball to Eyeball: The Inside Story of the Cuban Missile Crisis* (New York: Random House, 1991), pp. 3–25, 28–37; and Prados, pp. 46–50.

66. Its last commander was Capt. H. D. Mann. COMNAVFORCONAD 1965 History; *DANFS*, vol. 5, p. 76. Seven Willie Victors were lost while patrolling the barriers—five in the Atlantic and two in the Pacific—with a total of fifty-nine aircrew killed. Of the WV-2s lost, four crashed ashore (all during takeoff or landing), three at sea. Additionally, a WV-2 belonging to the AEW Training Unit Atlantic and an R7V (the transport version of the Super Constellation) belonging to VW 11 crashed at NAS Patuxent River while on training flights, with a loss of fourteen aircrew. Earles McCaul, "The Willie Victor Roster," http://personal.riverusers.com/~elmccaul/memoriam.htm. Considering the arduous conditions under which the Willie Victors flew, this is a respectable safety record, one that stands as a tribute to the skill and dedication of the aircrews and maintenance crews, and to a plane that could take a lot of punishment—even though it was a challenge to maintain.

67. *DANFS*, vol. 3, pp. 178, 444, 445, 451; vol. 4, pp. 129, 141; vol. 5, pp. 191, 296, 394; vol. 6, pp. 375, 419, 530; vol. 7, pp. 254, 514; vol. 8, p. 157. Gallagan, pp. 10–3.

68. Over the course of 1965, a major relocation of DERs took place. Two of the six in Newport went to the Pacific Fleet, and CORTRON 16 was disestablished. In the Pacific, three DERs were decommissioned, leaving twelve: eight at Pearl Harbor, three at Guam, and one at San Francisco. The DERs became a valuable asset in the Vietnam War, but they were growing old; the remaining twelve were laid up between 1968 and 1973. Jack Sweetman, *American Naval History*, 2d ed. (Annapolis, Md.: Naval Institute Press, 1991), pp. 243–4; Ross Wright [Capt., USN (Ret.)], commanding officer of USS *Vance* (DER 387) in 1963–65, letter to author, 3 November 1994; Friedman, pp. 233, 460–8. *DANFS*, vol. 3, pp. 273, 334, 673, 676; vol. 4, p. 152; vol. 5, p. 76; vol. 6, p. 365; vol. 7, p. 456; and vol. 8, p. 309.

69. Hyland, pp. 58–9.

70. Zeola, recorded oral history.

71. James G. Blight and David A. Welch, *On the Brink: Americans and Soviets Reexamine the Cuban Missile Crisis* (New York: Farrar, Strauss and Giroux, 1990), p. 328; and Brugioni, pp. 254–5.

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