NRO BY THE NUMB3RS

NATIONAL RECONNAISSANCE OFFICE

AT 60 YEARS

60

The National Reconnaissance Office has spent the past 60 years designing, building, launching, and maintaining America's intelligence satellites. Whether creating the latest innovations in satellite technology, contracting with the most cost-efficient industrial suppliers, conducting rigorous launch schedules, or providing the highest-quality products to its customers, the NRO never loses focus on who it is working to protect: the Nation and its citizens.

From its inception in 1961 to today, the NRO has worked tirelessly to provide the best reconnaissance support possible to the Intelligence Community and Department of Defense. The NRO is unwavering in its dedication to fulfilling its vision:

Supra Et Ultra—Above and Beyond.

59

On 30 April 1962, former NRO co-Director Richard Bissell was on-hand at Groom Lake in Nevada for the "first official flight" of the Lockheed/CIA A-12 reconnaissance aircraft. Lockheed test pilot Lou Schalk flew the aircraft for 59 minutes, reaching an altitude of 30,000 feet at just under 400 mph, for what Lockheed design chief Clarence "Kelly" Johnson claimed was the smoothest first official flight of any aircraft he had ever designed or tested. In the years following, the A-12 would set world records for the fastest speed and highest altitude of any plane ever built.

Groom Lake in Nevada - 1962


Mayo

58

In March 1958, future NRO Pioneer Reid D. Mayo was stuck in a Pennsylvania snowstorm while on a family vacation. He was working on a Naval Research Laboratory program that had previously developed crystal video technologies deployed on submarines to intercept and analyze Soviet radar signals. While waiting out the weather in a roadside Howard Johnson's, Mayo conceptualized the idea of mounting a solid state version of the periscope-mounted radar detector in a Vanguard-like satellite to collect radar signals over the Soviet Union. Returning to Washington, he proposed the idea to Howard Lorenzen, chief of the NRL electronic countermeasures branch. Lorenzen attained approval for the project, and just over two years later, the world's first operational intelligence satellite—the Galactic Radiation and Background (GRAB) satellite —was launched, less than two months after Francis Gary Powers' U-2 was shot down in the U.S.S.R.

57

Although the NRO was declassified in 1992, it did not publically disclose launches until four years later. In December 2020, NROL-44 was the 57th launch conducted by the NRO since it first started disclosing launches in December 1996. NROL-44 was a national security payload that was launched on a Delta-IV Heavy rocket at 8:09 PM EST on 10 December 2020 from Cape Canaveral.


NROL-44

56

RAF Menwith Hill, in Harrogate, United Kingdom is a British air force base that houses satellite ground stations and communications intercept antennas for the United Kingdom. Construction of the base began in 1956, and it became operational three years later. In 2008, the NRO announced that it maintains a presence at Menwith Hill and supports joint missions there through the provision of technical systems and shared research and development. The NRO's participation is achieved with the consent of the host government and contributes to the national security of both countries.

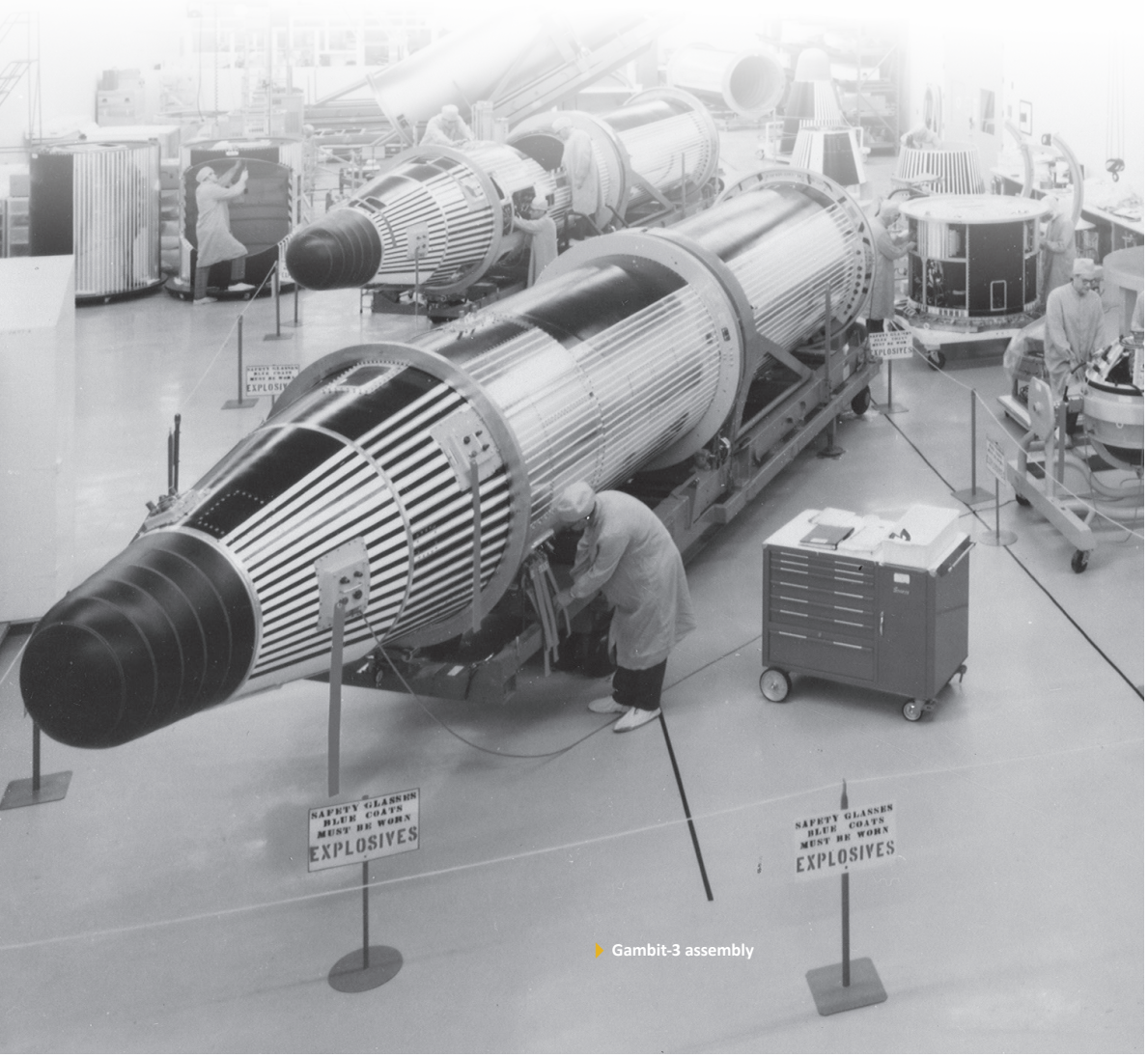
55

In 1996, the NRO began to publically announce its launches. As the 21st century dawned, the NRO decided that it needed to venture into social media to assist in its efforts to be more open and transparent for the American public. In 2015, the NRO created its own YouTube channel, and NROL-55 was the first NRO launch to be shown on that video-sharing platform. On 8 October 2015, a United Launch Alliance Atlas V rocket soared into space from California's Vandenberg Air Force Base at 5:49 a.m. PDT (8:49 a.m. EDT) to deliver the classified NROL-55 satellite into orbit. The mission also delivered 13 tiny cubesats into orbit for the NRO and NASA.


NROL-55

54

In July 1966, the NRO launched the first Gambit-3 mission. Also called Gambit-Cubed, the satellite carrying the new KH-8 camera was a significant improvement in both resolution and endurance over the Gambit-1 (KH-7) satellites it was replacing. Over the course of its 18-year history until April 1984, the Gambit-3 program launched 54 missions of which 50 were successful. With just four failures in 54 attempts, the Gambit-3 was remarkably more reliable than the Gambit-1, which experienced 10 failures in just 38 launch attempts.



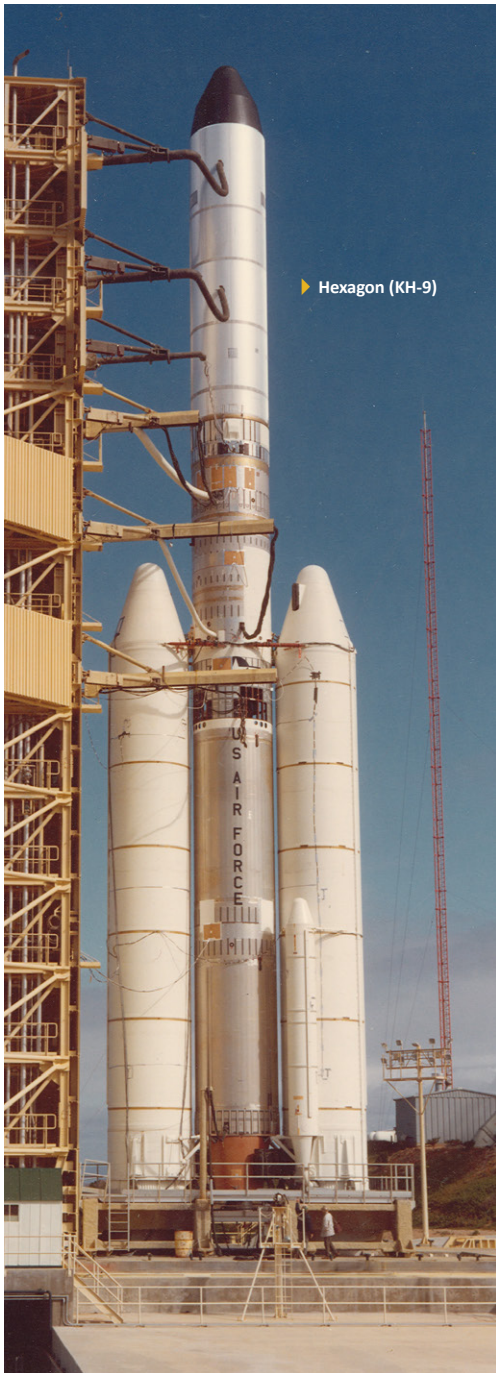
Gambit-3 assembly

53

In 1960, the Air Force purchased 11.4 acres of land in Sunnyvale, CA from Lockheed for $1 and established a Satellite Test Center to run Air Force satellite operations. For the next 53 years, the Air Force occupied that land, building the Sunnyvale Air Force Station, later renamed the Onizuka Air Force Station after Ellison Onizuka, the first Asian American astronaut to reach space, who died in the Space Shuttle *Challenger* disaster in 1986. In 2007, DNRO Donald Kerr presided over a deactivation ceremony marking the end of NRO's involvement with the facility. Onizuka AFS was closed in 2010, but the final land transfer to the City of Sunnyvale did not occur until 2013, finally marking the end of more than a half-century of Air Force ownership of the land.

52

On 15 June 1971, NRO launched the first Hexagon satellite with its KH-9 camera. The Hexagon was designed to replace both the Corona and Gambit systems, to not only collect a large amount of area for Corona's "search" mission but also to acquire excellent resolution imagery for Gambit's "surveillance" mission. However, those two missions are mutually exclusive; so while Hexagon far exceeded Corona's capabilities, it never did quite match the resolution of Gambit imagery. The Hexagon satellite was as big as a locomotive and carried 100 times as much film as the first Corona mission in 1960. On that first mission in 1971, equipment malfunctions limited the satellite to just over one month of imaging days, but the satellite remained in orbit for 52 days while engineers conducted further tests to the satellite to monitor its orbital behavior before it was deorbited.



Hexagon (KH-9)

51

Often the target of conspiracy theorists, UFO aficionados, and X-Files fans, Area 51 is an Air Force facility in the southern Nevada desert, 130 km northwest of Las Vegas, which has been used to test top secret government experimental aircraft. Among the equipment tested there were the U-2 and the A-12/SR-71 aircraft, which eventually served in NRO's Program D. Program D also used Area 51 to develop its experimental D-21 reconnaissance drone program, although the project was cancelled before the system became operational.

50

In addition to YouTube, the NRO Office of Public Affairs has created Facebook, Twitter, and Instagram accounts to spread the word about the work the NRO does for the American people. NRO created its Facebook account in January 2014, and as of January 2021, there were more than 50,000 people following the NRO Facebook page.

49

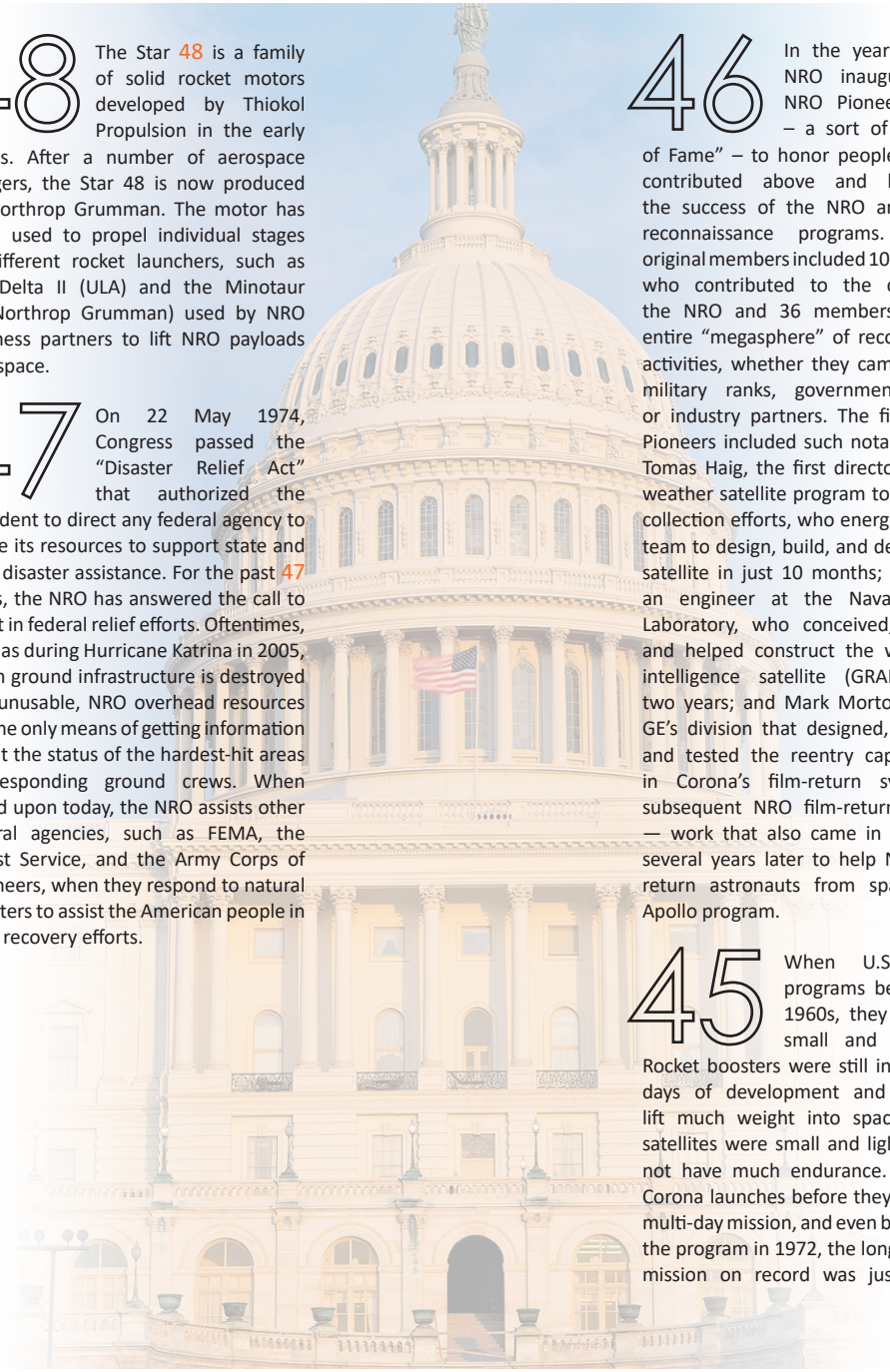
On 14 September 1996, President Clinton signed Presidential Decision Directive/NSC-49 which set Clinton's National Space Policy. Key policy changes in this directive included declassification of the "fact of" U.S. SIGINT and MASINT collection. This policy continued the Clinton Administration's efforts to declassify intelligence material to be more transparent to the American public, following the declassification of the Corona, Argon, and Lanyard programs the previous year. The declassification of SIGINT also set the stage for the eventual declassification of the first U.S. SIGINT programs – GRAB (in 1998) and Poppy (in 2004).

48

The Star 48 is a family of solid rocket motors developed by Thiokol Propulsion in the early 1980s. After a number of aerospace mergers, the Star 48 is now produced by Northrop Grumman. The motor has been used to propel individual stages of different rocket launchers, such as the Delta II (ULA) and the Minotaur IV (Northrop Grumman) used by NRO business partners to lift NRO payloads into space.

47

On 22 May 1974, Congress passed the "Disaster Relief Act" that authorized the President to direct any federal agency to utilize its resources to support state and local disaster assistance. For the past 47 years, the NRO has answered the call to assist in federal relief efforts. Oftentimes, such as during Hurricane Katrina in 2005, when ground infrastructure is destroyed and unusable, NRO overhead resources are the only means of getting information about the status of the hardest-hit areas to responding ground crews. When called upon today, the NRO assists other federal agencies, such as FEMA, the Forest Service, and the Army Corps of Engineers, when they respond to natural disasters to assist the American people in their recovery efforts.



46

In the year 2000, the NRO inaugurated the NRO Pioneer Program – a sort of NRO "Hall of Fame" – to honor people that have contributed above and beyond to the success of the NRO and national reconnaissance programs. The 46 original members included 10 "Founders" who contributed to the creation of the NRO and 36 members from the entire "megasphere" of reconnaissance activities, whether they came from the military ranks, government civilians, or industry partners. The first class of Pioneers included such notables as: Col Tomas Haig, the first director of a new weather satellite program to aid Corona collection efforts, who energized a small team to design, build, and deploy a new satellite in just 10 months; Reid Mayo, an engineer at the Naval Research Laboratory, who conceived, designed, and helped construct the world's first intelligence satellite (GRAB) in just two years; and Mark Morton, who led GE's division that designed, fabricated, and tested the reentry capsules used in Corona's film-return system and subsequent NRO film-return programs — work that also came in very handy several years later to help NASA safely return astronauts from space in the Apollo program.

45

When U.S. satellite programs began in the 1960s, they started off small and short-lived. Rocket boosters were still in their early days of development and could not lift much weight into space. Because satellites were small and light, they did not have much endurance. It took 18 Corona launches before they achieved a multi-day mission, and even by the end of the program in 1972, the longest Corona mission on record was just 19 days. Gambit first flew in 1963 and achieved a 2-day mission on just its second flight. However, it was still slow to improve, and it was not until 1966 on its 25th mission that Gambit was able to stay in orbit for a full five days. By the time of the first Hexagon flight in June 1971, the longest NRO photoreconnaissance mission ever had been just 19 days. But that would soon change.

It was hoped that its improved capabilities would allow Hexagon to replace both Corona and Gambit. By the early '70s, launchers had gotten much bigger and more powerful. So Hexagon, colloquially called "Big Bird," was as large as a locomotive and could carry ten times as much imagery as the most advanced Corona. With its four film-return buckets, it could also stay in orbit for much longer, as it could send down its initial imagery collection for analysts to see while it kept imaging new targets. Hexagon was originally designed to stay in orbit for up to 45 days, already more than double the longest-ever photoreconnaissance mission. But as Hexagon operations progressed, it was quickly found that the KH-9 was collecting so much imagery that the analysts on the ground could not process the take as quickly as it was being collected. So Hexagon engineers started to extend the orbital life of the satellites, and mission planners started extending the missions. By 1977, Mission #1213 achieved the first 6-month mission, and Mission #1218 in 1983-84 set the film-return satellite record of 271 imaging days.

44

When the NRO was created on 6 September 1961, the two co-Directors, Dr. Joseph V. Charyk and Dr. Richard M. Bissell Jr., were immediately thrown into the unenviable position of directly supervising vastly different groups located in different locations around the country (VA, MD, and CA). To accomplish their mission Charyk and Bissell relied on a small NRO Staff, which consisted of just 44 people, including secretaries and airmen, mostly located in room 4C-1000 of the Pentagon. Even as the NRO grew through the decades, the NRO Staff remained small, which allowed the NRO to remain agile and adaptable and avoid long delays from unexpected setbacks like launch failures.

43

It was a habit in early NRO photoreconnaissance programs to number each individual flight with a four-digit mission number, with a different numbering group being used for different systems. Early Corona flights were given mission numbers in the 9000-range, but in 1963 when the new Corona J system was introduced with the first two-bucket film-return system, the mission numbers changed to the 1000-range. When Gambit was introduced in 1963, the flights were slated with mission numbers in the 4000-range; the last Gambit-1 flight in 1967 carried the Mission #4038 designation. But when the improved Gambit-3 system was being developed, the initial test flights occurred while Gambit-1 flights were still being launched. So the NRO had to create a new numbering system for Gambit-3. The first Gambit-3 flight was launched on 29 July 1966, carrying Mission #4301, and all further Gambit-3 flights carried mission numbers in the 4300-range.

NROL-82

42

Although it happened 19 years before the creation of the NRO, the year 1942 was very consequential to future leadership of the NRO. In 1942, the future first Director of the NRO (DNRO), Joseph V. Charyk graduated with a double major in Engineering and Physics from the University of Alberta, six years before he became a naturalized American citizen. Also in that year, the future 3rd DNRO Brockway McMillan entered the U.S. Navy, serving at the Naval Proving Ground (Dahlgren) and the Los Alamos National Laboratory during the course of WWII. Like Charyk, the 5th DNRO James W. Plummer graduated from the University of California, Berkeley in 1942, and although not enrolled in college at the time, future 14th DNRO Peter B. Teets was born in Denver, Colorado.

41

On 26 April 2021, the NRO launched NROL-82 on a Delta-IV Heavy rocket. The national security launch, which occurred at 1:47 PM PDT (4:47 EDT) from Vandenberg AFB in California, was the 41st NRO launch using the Delta-IV launch system.

40

When the very first successful Corona mission (Discoverer-14) launched in August 1960, it carried 40 pounds of film, and it collected more imagery of the Soviet Union than all of the U-2 missions up until that time. The amount of film carried by Corona missions was not appreciably improved until the new KH-4 (Mural) camera was introduced on the 31st Corona mission in February 1962.

Gambit-1 (KH-7) image of Chin-Chin-Hsia Nuclear Energy Complex China - 2 May 1965

39

The NRO was very busy in 2020, launching an unprecedented six separate missions during the calendar year. The sixth and last launch, NROL-108 was a national security payload launched on a Falcon 9 rocket from Kennedy Space Center Launch Complex 39A (LC-39A) in Florida on 19 December 2020.

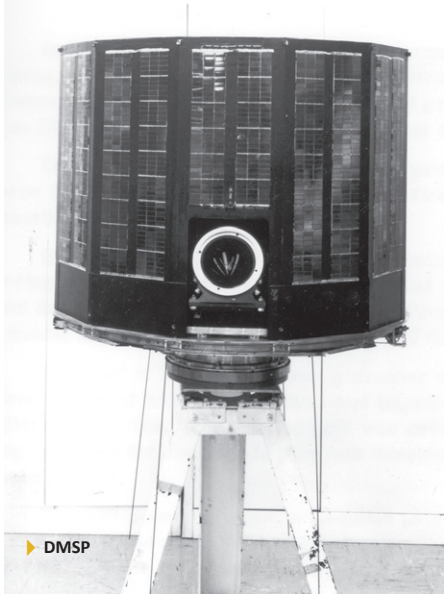
38

The Gambit-1 satellite was the nation's first high-resolution imagery satellite and the first satellite that began development after the NRO was created in September 1961. While the Corona system was a "search" system designed to image large areas and identify new targets, Gambit was a "surveillance" system designed to image particular targets at much greater resolution to acquire particular intelligence secrets of much greater value. The resolution of Corona started off in 1960 at approximately 35-40 feet and improved to 5-7 feet by the program's end in 1972. In comparison, the high-resolution Gambit-1 system began in 1963 at about 6 feet but improved to 2-3 feet by the program's end in 1967. From July 1963 to June 1967, the Gambit-1 system was launched on 38 missions, but 10 of those missions were unsuccessful due to both launcher and satellite failures.

C-119J number 37

37

On 19 August 1960, Capt Harold E. Mitchell flew his C-119J aircraft, using call sign *Pelican 9*, southwest of Hawaii and caught the film bucket from the Discoverer (Corona) 14 satellite, retrieving the first-ever intelligence photos of the Earth taken by a satellite. Capt Mitchell's crew were members of the 6593d Test Squadron (Special), known as the "Star Catchers," who were responsible for retrieving all of the film buckets from every Corona, Gambit, and Hexagon launch. Capt Mitchell's aircraft bore side number 37 and is currently on display at the National Museum of the USAF at Wright-Patterson Air Force Base outside Dayton, OH.



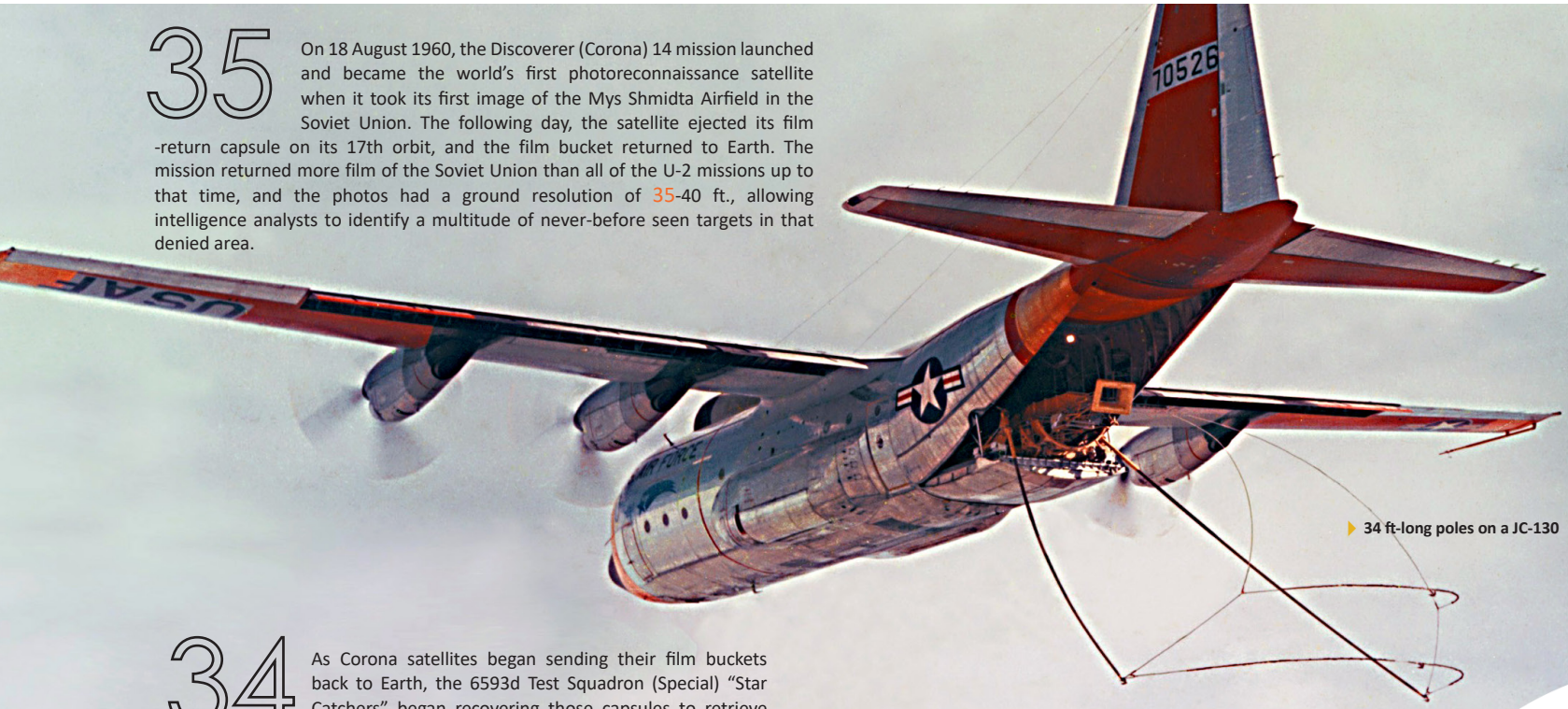
DMSP

36

The Defense Meteorological Satellite Program (DMSP) was an NRO project to build and operate a weather satellite to assist the NRO's earliest photoreconnaissance programs. Since film-return satellites were so dependent on the amount of film each satellite could carry, taking cloud-covered photos was a tremendous waste of time, money, and effort. The NRO could not wait for a national weather satellite being developed by NASA, and program director Lt Col Thomas O. Haig was able to launch the first successful DMSP satellite in just 10 months. Although the DMSP was initially an "interim" program to fill the gap until the national weather satellite was developed, it proved so successful that it operated under the DoD for 36 years from 1962 until it was turned over to NOAA in 1998.

35

On 18 August 1960, the Discoverer (Corona) 14 mission launched and became the world's first photoreconnaissance satellite when it took its first image of the Mys Shmidta Airfield in the Soviet Union. The following day, the satellite ejected its film -return capsule on its 17th orbit, and the film bucket returned to Earth. The mission returned more film of the Soviet Union than all of the U-2 missions up to that time, and the photos had a ground resolution of 35-40 ft., allowing intelligence analysts to identify a multitude of never-before seen targets in that denied area.



34 ft-long poles on a JC-130

34

As Corona satellites began sending their film buckets back to Earth, the 6593d Test Squadron (Special) "Star Catchers" began recovering those capsules to retrieve the imagery collected by the satellites. The Star Catchers flew in specially modified C-119J and JC-130 transport aircraft that were flown west of the Hawaiian Islands for the recovery operations. In addition to the pilots and navigators, each aircraft consisted of a four-man crew who operated the recovery equipment outside the open rear hatch of the aircraft, while flying typically between 15,000 – 20,000 feet above the Pacific Ocean. To conduct the retrieval of the parachutes, loadmasters manually attached a pair of 34 ft-long poles to special brackets on the aircraft and lowered them out the back of the cargo bay. Between the poles was strung nylon cord with large copper hooks that caught the parachute as the aircraft flew over it and snagged the chute and its precious cargo. The nylon cord, chute, and film bucket were then retrieved with a winch and brought onboard the aircraft by the recovery crew, who were attached to the aircraft with their own safety cords to prevent falling out the back of the aircraft.

33

In 2008, the NRO announced that it maintains a presence at the Joint Defense Facility Pine Gap. This joint facility occupies 33 acres of land outside Alice Springs in Australia's Northern Territory. Similar to RAF Menwith Hill, the NRO supports joint missions at these locations through the provision of technical systems and shared research and development. The NRO's participation is achieved with the consent of the host governments and contributes to the national security of the countries involved.

32

In the 1980s, NASA and Air Force teamed together to create the Manned Spaceflight Engineer (MSE) program. Since the DoD was ordered by President Reagan to utilize NASA's Space Shuttle for launches of military payloads to space, the NRO/Air Force demanded to have one crew member slot allocated to the Air Force, whenever a DoD payload was launched on the shuttle. The MSE program recruited exceptional military officers and trained them to astronaut standards. In all, 32 officers from various military branches were trained as MSEs. However, the program faced strong resistance from NASA, and after the *Challenger* accident in 1986, the MSE program slowly faded before being cancelled in 1989.

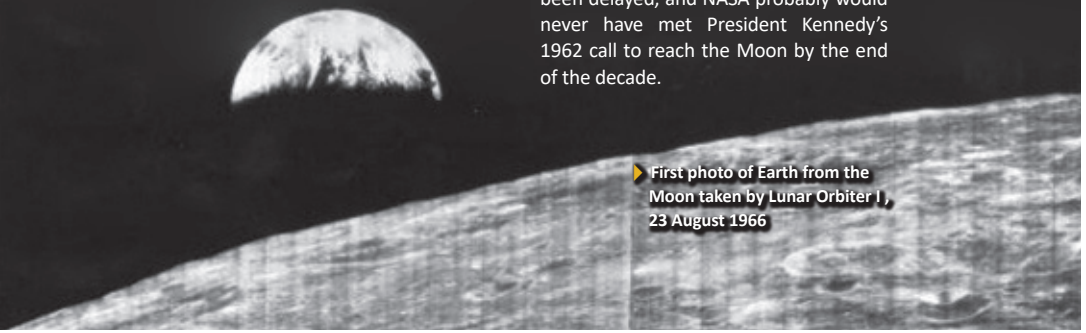
31

The first Hexagon KH-9 satellite was launched on 15 June 1971, and that first vehicle spent 31 imaging days before the last of its four film buckets was ejected from the satellite and sent back down to Earth. Over the course of Hexagon's history, its capabilities and endurance dramatically increased, eventually staying in orbit for nine months and collecting over 300,000 feet of imagery for the nation's intelligence officers to analyze.

30

In 1963, NASA requested bids for the Lunar Orbiter program for a reconnaissance satellite to fly to the Moon and map the lunar surface to discover potential landing sites for NASA's Apollo program. Eastman Kodak had previously developed an analog near real-time imagery camera, designated the E-1, for the NRO during the Samos program, but it was determined to be insufficient for NRO's reconnaissance needs due to the limited transmission times available during the camera's low-earth orbit and the lack of encoded transmission capability. In order to recoup some of their investment in the E-1, Kodak asked for and received permission from the NRO to use the E-1 technology in a bid for the NASA contract.

While the Kodak bid was the most expensive received by NASA, it was the only one with proven technology, and Kodak was chosen for the project. NASA flew five Lunar Orbiter missions to the Moon in 1966-67 using Kodak's modified E-1 to photograph the lunar surface. From an altitude of about 30 miles, the Lunar Orbiter mapped 99% of the Moon's surface, discovering potential landing sites for all Apollo missions, while also taking one of the most famous pictures of the Earth in the process. If the NRO had not allowed Kodak to use their E-1 camera that was produced under a classified government contract, the development of the Lunar Orbiter would surely have been delayed, and NASA probably would never have met President Kennedy's 1962 call to reach the Moon by the end of the decade.



First photo of Earth from the Moon taken by Lunar Orbiter I, 23 August 1966

29

In the early 1960s, the CIA and Lockheed developed the A-12 high altitude reconnaissance aircraft as the follow-on to the U-2. The A-12 was, and still is, the fastest and highest flying airplane ever created in the history of flight. However, the primary mission of the A-12 — reconnaissance flights over the Soviet Union — had ceased to exist, after President Eisenhower promised never to overfly the Soviet Union again after the shootdown of Francis Gary Powers' U-2 in May 1960. When the A-12 was finally declared operational in 1965, it had no defined mission.

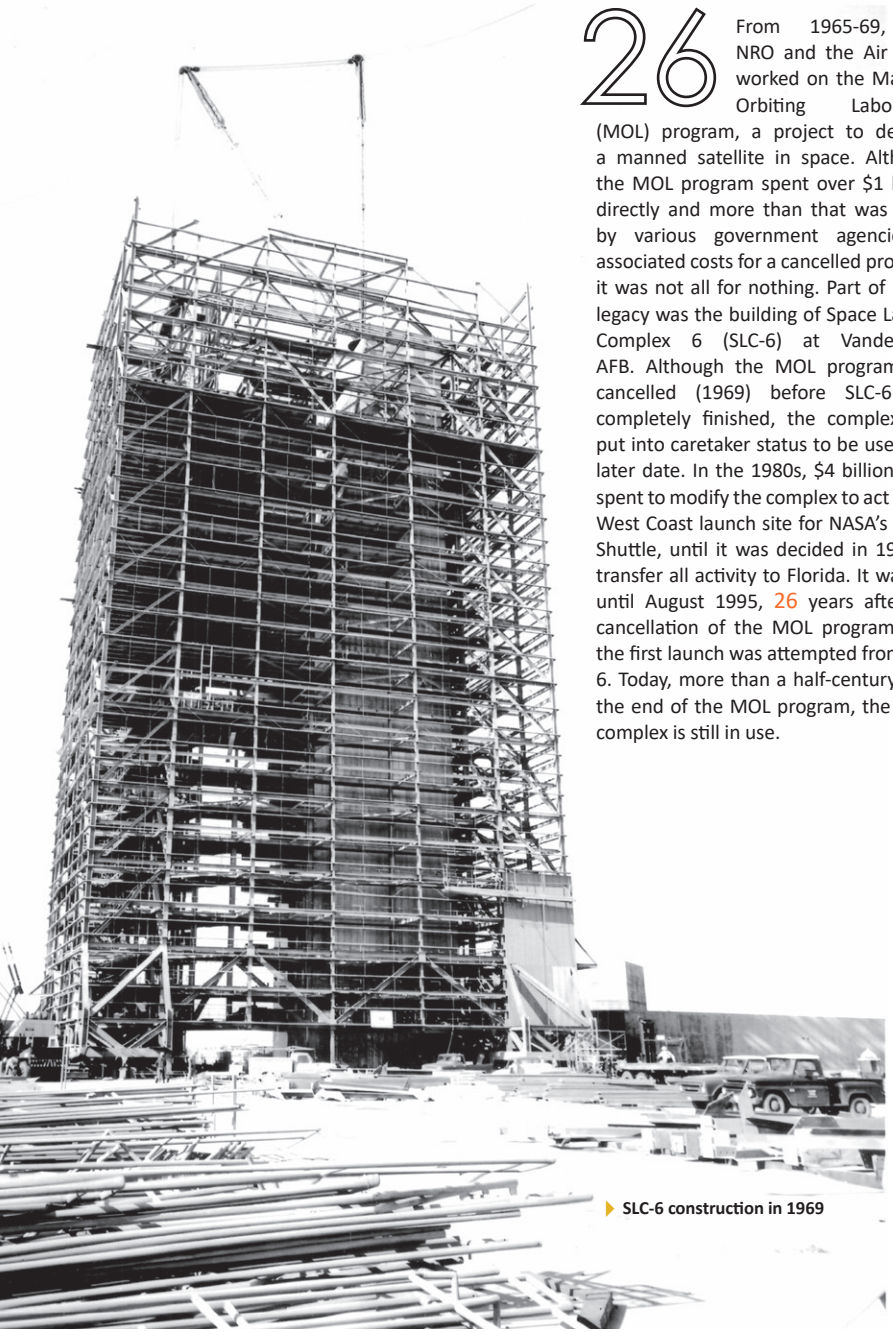
In mid-1967, military and government officials were worried about reports of surface-to-surface missiles being deployed in North Vietnam. Since the Air Force's version of the A-12, the SR-71, was not yet operational, CIA pilots for NRO's Program D deployed to Okinawa for Operation BLACK SHIELD. Over the next year, six CIA pilots flew 29 missions over North Vietnam and North Korea, successfully cataloging military deployments throughout North Vietnam and identifying the captured USS *Pueblo* in North Korea. The A-12 program was cancelled in June 1968 due mainly to the high cost and the Air Force's SR-71 becoming operational.

28

The first satellite to be designed after the NRO was formed, the Gambit-1 was the nation's first high-resolution satellite. First launched in July 1963, just four years after the first Corona launch attempt, the Gambit was remarkably more reliable than the Corona. The first three Gambit flights were successful in nearly every aspect; compare that to Corona that took 13 flights (14 if one counts the 1st attempt that was aborted before ignition and never left the pad) before a successful flight was recorded. In all, during its four-year history, Gambit-1 had 28 successful missions with just 10 failures, or a nearly 75% success rate over the course of the entire program. In comparison, it took five years before the Corona program achieved a single year in which it had a 75% success rate.

27

In 2003, President George W. Bush signed National Security Presidential Directive 27 (NSPD-27), outlining the Bush administration's new policy of government support to the U.S. domestic commercial imagery industry. NSPD-27 updated the Clinton administration's original commercial industry policies from 1994, since the commercial industry was by then much better developed. The directive instructed federal agencies to utilize commercial imagery when practicable to save government resources. This policy allowed the NRO and National Imagery and Mapping Agency to acquire commercial mapping imagery, thus enabling better utilization of NRO's imagery satellites to acquire more imagery of intelligence targets at better resolutions.



SLC-6 construction in 1969

26

From 1965-69, the NRO and the Air Force worked on the Manned Orbiting Laboratory (MOL) program, a project to develop a manned satellite in space. Although the MOL program spent over $1 billion directly and more than that was spent by various government agencies in associated costs for a cancelled program, it was not all for nothing. Part of MOL's legacy was the building of Space Launch Complex 6 (SLC-6) at Vandenberg AFB. Although the MOL program was cancelled (1969) before SLC-6 was completely finished, the complex was put into caretaker status to be used at a later date. In the 1980s, $4 billion were spent to modify the complex to act as the West Coast launch site for NASA's Space Shuttle, until it was decided in 1989 to transfer all activity to Florida. It was not until August 1995, 26 years after the cancellation of the MOL program, that the first launch was attempted from SLC-6. Today, more than a half-century after the end of the MOL program, the SLC-6 complex is still in use.

25

In April 1960, the U.S. Army unveiled pictures of American cities taken at night and through clouds using a synthetic aperture radar (SAR) system mounted in a small aircraft. In 1962, the NRO began the Quill program, an experimental proof-of-concept project to determine if collection of usable SAR imagery from satellites was feasible. In just 25 months, Maj David D. Bradburn (who would later become a Major General and director of NRO's Program A) was able to lead a small team, using off-the-shelf technology, to quickly and efficiently get the program off the ground. The first (and only) Quill launch occurred on 21 December 1964. The satellite worked so well that a second planned launch was cancelled, since all of the program's objectives had been met during the first launch. In the final evaluation of the experiment, it was found that usable SAR imagery could indeed be collected from satellites. However, the resolution of the Quill imagery was relatively poor, and it would be many years before the IC would be able to build a usable radar satellite; it was not until 9 June 2008 that the DNI declassified the "fact of" NRO radar satellite reconnaissance.

24

The U.S. launched the world's first film-return photoreconnaissance satellite, Corona-14, in August 1960. The last successful film-return satellite, Hexagon-19, was launched in 1984. As the nation's leading film producer, in addition to their successful support provided to the U-2 program, the Eastman Kodak Company was called upon to support the fledgling U.S. film-return photoreconnaissance program. Operating from their Bridgehead plant in Rochester, NY, Kodak supplied and processed all of the film that was used in the Corona, Gambit, and Hexagon programs over the course of the 24-year history of the U.S. film-return satellite program.

23

In November 1954, President Eisenhower authorized the start of the U-2 reconnaissance aircraft program to be built by Lockheed and run by future NRO co-director Richard M. Bissell, Jr., the CIA's Deputy Director for Plans. Lockheed's genius aircraft designer, Clarence "Kelly" Johnson, built the first prototype of the U-2 in just eight months, and by early 1956, it was ready for deployment. The first operational flight of the U-2 occurred in June, and the first flight over the Soviet Union was flown on 4 July 1956. Over the next four years, 23 successful U-2 missions were flown over the U.S.S.R., acquiring priceless essential intelligence at a time when the U.S. had few intelligence sources about the Soviets. The 24th attempted flight over the Soviet Union on 1 May 1960 was shot down, and Eisenhower later promised never to overfly the Soviet Union with reconnaissance aircraft, a promise kept by him and all subsequent presidents.

22

The Titan III-D was an expendable launch system used by the NRO from 1971 until 1982. Built by Martin Marietta and launched from Space Launch Complex 4E at Vandenberg AFB, a total of 22 launches were conducted, mostly carrying KH-9 Hexagon satellites, without a single launch failure. The Titan III-D was retired in 1982 and replaced by the Titan 34-D.

D-21B drones under each wing of a B-52

21

In October 1962, the CIA authorized Lockheed to develop the D-21 drone to be launched from the A-12 surveillance aircraft. The D-21 was a ramjet-powered drone capable of flying at Mach 3.3 at 90,000 feet for 3,000 miles with a miniscule radar cross section to keep from being detected. Lockheed built a total of 33 airframes for NRO's Program D, but when a test mishap killed a Lockheed test pilot aboard the A-12 mothership, Kelly Johnson ended Lockheed's participation in the program. The Air Force continued the program with the already-built airframes to be launched toward Chinese airspace from B-52 bombers. But after four less-than-successful test flights, the program was cancelled in 1971.

20

The Hexagon satellite system was the NRO's follow-on to the Corona system developed in the late 1950s. First launched in 1971, the hybrid Hexagon system was able to both acquire tremendously greater amounts of imagery and at significantly higher resolutions than even the last Corona satellites, which flew until 1972. By comparison, the Corona system acquired 2.1 million feet of film through 145 launches over 12 years, while the Hexagon could carry over 300,000 feet of film in each satellite. The "Big Bird" satellite was as large as a locomotive and could stay in orbit for up to nine months at a time. From June 1971 - April 1986, the NRO launched 20 Hexagon satellites, although the last satellite was destroyed when its Titan booster exploded nine seconds after launch.

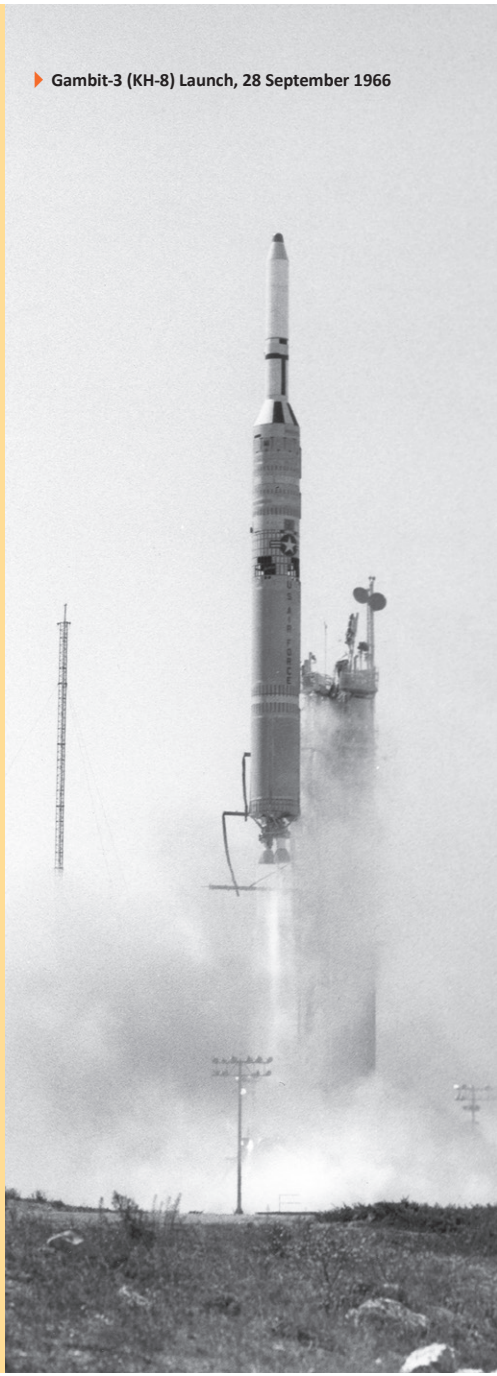
19

There have been 19 Directors of the NRO (DNROs) in the organization's history. When created in 1961, the NRO was led by co-directors, Dr. Joseph V. Charyk, the Under Secretary of the Air Force, and Dr. Richard M. Bissell, the CIA Deputy Director for Plans. After Bissell retired in 1962, the NRO was led by a single DNRO, always a senior Air Force official (usually the Assistant or Under Secretary of the Air Force).

In 2005, Dr. Donald Kerr was appointed as the first independent DNRO. Today, the NRO is still led by independent Directors, with a senior CIA civilian as the Principle Deputy Director, and a senior uniformed general officer as the Deputy Director. On 1 August 2019, Dr. Christopher Scolese was appointed as the 19th DNRO, coming over from NASA's Goddard Space Flight Center.

18

Approximately one year after the first launch of Corona, the NRO began development of its first high-resolution satellite program, codenamed Gambit. Over time, the Gambit program evolved into two different systems. The Gambit-1, launched in 1963, was equipped with the KH-7 camera system that included a 77-inch focal length camera for providing specific information on scientific and technical capabilities that threatened the nation. The second system, Gambit-3, was equipped with the KH-8 camera system that included a 175-inch focal length camera. The Gambit-3 was first launched in 1966 and operated for 18 years, until 1984. The KH-8 camera collected some of the highest resolution imagery ever collected by any U.S. satellite system.



Gambit-3 (KH-8) Launch, 28 September 1966

Photograph of 14 of the 17 MOL astronauts

A-12 Aircraft

17

When the Air Force introduced the MOL program in 1965, its mission was described to the public as a working test station to conduct experiments on how extended time in space affected man and other scientific experiments. However, the real secret mission of the program was to launch an advanced KH-10 Dorian camera system to be operated by the astronauts in the satellite. Having a manned surveillance satellite would enable the system to take better imagery and to react to weather and quickly moving political/military events on Earth. Over the four-year period of the program, 17 military personnel were trained by the NRO and Air Force to astronaut standards to operate inside the satellites for up to 30 days at a time.

16

The first successful return of satellite reconnaissance imagery from space occurred on 19 August 1960, one day after the launch of Corona-14. The Corona program launched a total of 145 missions until May 1972, collecting a total of approximately 2.1 million feet of film over the life of the program. The very first Corona-14 mission returned 3,000 feet of film, more than all the U-2 missions up until that time. Over the years, as technology improved, the Corona satellites became more and more capable. In 1963, the Corona J-1 system was the first to carry two separate film-return capsules, improving the responsiveness of the system and increasing the amount of film that could be carried. On the last mission in May 1972, the Corona J-3 system carried 16,000 feet of film, more than five times the amount carried on the first Corona mission.

15

The very first A-12 reconnaissance aircraft was delivered to the CIA by Lockheed in early 1962. By the end of the program, a total of 15 A-12 airframes were produced. During flight tests and operations, a total of six aircraft were destroyed. The remaining nine airframes have all been put on display across the country. Eight of the planes are in various museums accessible to the public, such as the Museum of Flight in Seattle, WA and the Southern Museum of Flight in Birmingham, AL. The ninth aircraft, Article 128, is on display at the CIA's headquarters compound in Langley, VA.

14

Although the NRO is sometimes described as having 13 "Directorates," that is a bit of a misnomer. Technically, the NRO has just 10 Directorates because three of its line work units are officially "Offices." But besides that semantic exercise, there is also a Corporate Staff; although smaller than the main directorates, the "14th Directorate" is similar to the "12th Man" in football and as an enabler is just as important to the NRO's success as any of the other line units. All 14 work units in the organization differ in size and roles, but they all work tirelessly to contribute to NRO success, and none of them could fulfill the NRO's mission without the help of the others.

13

On 11 August 1960, Discoverer-13 released its film bucket, and it returned to Earth, splashing down in the Pacific Ocean near Hawaii. That was the first time in history that a man-made object was recovered after it had gone to space. That mission was the last Corona test mission, and it finally proved the concept of film-return reconnaissance was possible. In addition to some equipment that conducted scientific experiments and helped monitor the satellite during its mission, there was an American flag inside the film bucket. That flag was later presented to President Eisenhower at a press conference in the White House, and today, the flag is housed in the Eisenhower Presidential Library in Abilene, KS.

12

First authorized by President Eisenhower in February 1958, a "crash" effort to develop the Corona program successfully returned reconnaissance imagery to Earth by August 1960. Over the next 12 years, the Corona program would return about 2.1 million feet of film to Earth with over 800,000 images to be analyzed by government imagery analysts. Corona imagery revealed thousands of "firsts" about the Soviet Union — including debunking the "Missile Gap" — that were not available to intelligence analysts through any other means.

President Eisenhower with recovered Discoverer-13 film bucket

11

On 19 December 1976, the NRO launched the Kennen (KH-11) near real-time electro-optical satellite, which transmitted its images to Earth via a relay satellite. While NRO's film- return satellite systems were answering important intelligence questions for years, the time-sensitive photos being collected took too long to reach analysts for exploitation, and policy makers needed answers faster. The KH-11 was the world's first digital near real-time intelligence collection system, and it changed the time between photo acquisition and analyst exploitation from days/weeks to near real-time.

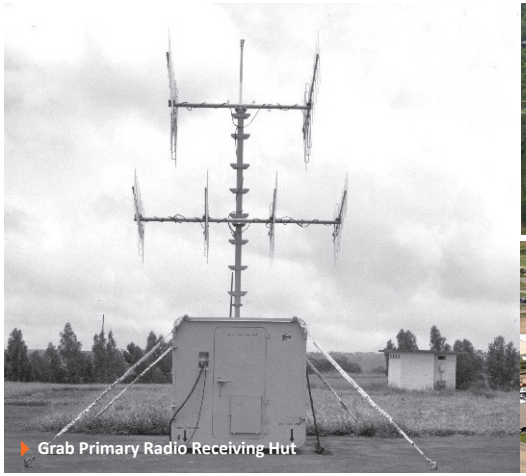
10

In the year 2000, NRO inaugurated the NRO Pioneer Program and named 10 individuals as "Founders" of the NRO. Those individuals occupy a unique position in the history of the NRO. Through their wise advice and counsel, they persuaded national decision makers that a policy of peacetime strategic reconnaissance could, and would, succeed. This mix of advisors, innovators, and scientists instilled in the nation's leaders a sense of confidence that establishing the NRO was the right thing to do and would pay huge dividends for the country in the years to come. By their influence, they shaped the emerging discipline of national reconnaissance and guaranteed for the United States a position of world leadership in the arena of space-based intelligence collection. Those 10 individuals were: William Baker, Merton Davies, Sidney Drell, Richard Garwin, Amrom Katz, James Killian, Edwin Land, Frank Lehan, William Perry, and Edward Purcell. In 2013, just before his death, the NRO added one important name, Jimmie Hill, to that list. Today, the NRO auditorium bears the name, the JD Hill Conference Center, in honor of Jimmie D. Hill.

9 In June 1960, the Air Force launched the world's first reconnaissance satellite, the Galactic Radiation And Background (GRAB) ELINT satellite that had been built by the Naval Research Lab, the core of the future NRO Program C. The GRAB program lasted two years until it was replaced by its follow-on, the Poppy satellite. Over the course of the 11-year history of America's first ELINT program through 1971, there were 9 successful GRAB/Poppy launches out of 12 attempts. Intelligence derived from data that GRAB and Poppy collected went to support a wide range of intelligence applications, particularly providing cues to the location and capabilities of radar sites within the Soviet Union.

8 The NRO's first high-resolution satellite, the Gambit-1, was first launched in July 1963. Utilizing the new KH-7 camera and achieving film resolutions as good as 2-3 feet, the Gambit-1 flew 38 missions (28 successful) through June 1967. While the first mission lasted just over one day, seven of the last nine Gambit-1 missions lasted 8 days.

7 When the Manned Orbiting Laboratory program was cancelled in 1969, the program managers attempted to have the remaining 14 crew members transferred to NASA so that they could continue in the U.S. space program. After significant political pressure, NASA agreed to take 7 of the crew members (those that were 35 years old or younger) and add them into their astronaut program. All seven of those astronauts—Richard Truly, Karol Bobko, Robert Crippen, C. Gordon Fullerton, Henry Hartsfield, Robert Overmyer, and Donald Peterson—went on to eventually fly on the Space Shuttle with NASA and Truly serving as NASA administrator.


Grab Primary Radio Receiving Hut

6 The CIA and Lockheed developed the A-12 reconnaissance aircraft in the early 1960s to replace the U-2. The A-12 OXCART program built the world's fastest and highest flying aircraft ever produced, exceeding Mach 3.2 at 90,000+ feet altitude. Since President Eisenhower promised never to overfly the Soviet Union after a U-2 was shot down in 1960, the A-12 was never allowed to conduct the mission it was designed for — aerial reconnaissance over Soviet territory.

The A-12 flew operationally, in support of NRO's Program D, only for a short time between 1967-68 over North Vietnam and North Korea. Flying out of Kadena air base on Guam as part of Operation BLACK SHIELD, 6 CIA pilots (Kenneth Collins, Jack Layton, Frank Murray, Dennis Sullivan, Mele Vojvodich Jr., and Jack Weeks) flew 26 missions over Southeast Asia and three over North Korea.


ADF-E


ADF-C

5 In July 1966, the NRO launched the first Gambit-3, its newest high-resolution satellite. The Gambit-3 utilized a 175-inch focal length camera, compared to the 77-inch focal length camera used in the Gambit-1 satellites. That first mission lasted just 5 days, but the system improved over the course of its 18-year history to achieve mission durations as long as 126 days.

4 Ten months after the NRO was formed, DNRO Joseph Charyk established the basic organizational structure that the NRO would keep for the next thirty years by creating 4 main Programs: Program A (Air Force, located in California), Program B (CIA, located in Virginia), Program C (Navy, located in Washington D.C. and Maryland), and Program D (Aircraft projects). Although Program D was deactivated in 1974, the other three remained until 1992, when the Alphabet Programs were restructured into functional "INT-based" directorates that remain today.

3 The NRO utilizes 3 ground stations around the country to facilitate communications and to receive the electronic data collected by its satellites. This network includes the Aerospace Data Facility–East at Ft. Belvoir, Virginia; the Aerospace Data Facility–Southwest at the White Sands Missile Test Range, New Mexico; and the Aerospace Data Facility–Colorado at Buckley Air Force Base, Colorado. Each is a multi-mission facility that supports worldwide defense operations and the collection, analysis, reporting, and dissemination of intelligence information for multiple agencies.


ADF-SW

2

While more than 30 military officers were trained to fly on the Space Shuttle during the Manned Spaceflight Engineer program, only 2 Air Force pilots ever did fly on the shuttle as an MSE before the program was cancelled. Gary Payton and William Pailes both flew on classified DoD shuttle missions in 1985. While only two MSEs ever flew on the shuttle, all of the men and women trained as MSEs went on to have distinguished military careers. Both Payton and Pailes retired as colonels, and five of the other MSEs retired as generals.

NASA *Discovery* (STS-51C) Launch 24 January 1985 with Gary Payton onboard

1

Over the past 60 years, the NRO and its dedicated employees have tirelessly worked Supra et Ultra (Above and Beyond) to serve and protect 1 nation and its people.

If you would like to learn any more about NRO history, please see the following CSNR publications on NRO's public website www.NRO.gov:

1. Bridgehead: Eastman Kodak Company's Covert Photoreconnaissance Film Processing Program
2. The Corona Story
3. The DORIAN Files Revealed: A Compendium of the NRO's Manned Orbiting Laboratory Documents
4. The Gambit Story
5. GRAB and POPPY: America's Early ELINT Satellites
6. The Hexagon Story
7. A History of the Military Polar Orbiting Meteorological Satellite Program
8. Critical to U.S. Security: The Gambit and Hexagon Satellite Reconnaissance Systems Compendium
9. Leaders of the NRO Vol. 1
10. Leaders of the NRO Vol. 2
11. The National Reconnaissance Office at 50 Years: A Brief History
12. NRO Almanac 2016
13. Pioneers of National Reconnaissance 1960-2000
14. SAMOS to the Moon: The Clandestine Transfer of Reconnaissance Technology Between Government Agencies
15. Spies in Space: Reflections on National Reconnaissance and the Manned Orbiting Laboratory

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