

The Coldest Warriors

Tales from the corridors of an agency so secret that officially it didn't exist

Air & Space Magazine

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In August 18, 1960, the first operational U.S. spy satellite snapped scores of pictures of forbidden places in the heart of the Soviet Union. The high-flying sentinel and its successors, known by the suitably ambiguous name Discoverer, were part of a top-secret program called Corona, and they started a revolution in intelligence by returning to Earth film that contained unprecedented detail about the Russians' fiercely protected military structure and facilities.

Air Force generals who had been indifferent toward spying from space changed their minds about the value of satellites when eye-popping photographs of Soviet bombers and missiles, submarines and cruisers, tanks, airfields, nuclear test sites, navy yards—more targets than they'd ever seen—began floating down out of the blue. And old hands at the Central Intelligence Agency saw that a new era was at hand.

"For the analysts and estimators," the CIA's Albert D. "Bud" Wheelon would write years later, "it was as if an enormous floodlight had been turned on in a darkened warehouse." But with the floodlight came the inevitable question of who would get to aim it, and shortly after the first dramatic triumphs of Corona, a battle for control of the country's intelligence assets erupted. The beginning of the long reconnaissance war coincided roughly with the creation in 1961 of a secret organization—the National Reconnaissance Office—to manage all spyplanes and satellites under a National Reconnaissance Program. Perhaps more relevantly, the start of hostilities also coincided with the departure from public service of Richard M. Bissell Jr., the CIA's assistant director for plans and development under Director Allen W. Dulles.

Bissell was part of the brainy club of scientists, engineers, and high-level bureaucrats who thought up the Corona program. Other members included Polaroid's Edwin "Din" Land, Harvard's James Baker and Edward Purcell, RAND Corporation's Merton E. Davies and Amrom Katz, and MIT's president, James R. Killian. These men worked together so congenially that they amounted to a fraternity of grown-up whiz kids, but it was Bissell who set the tone of the program.

The scion of Connecticut insurance Brahmins, Bissell was a courtly, mild-mannered guy who ran the Idealist (U-2) and then the supersonic Oxcart (A-12) spyplane programs. He believed in spartan, streamlined command systems, small staffs, collegiality, and generous funding from a pocket that was deep, black, and free of red tape. Bissell's U.S. Air Force counterpart in Corona was Brigadier General Osmund J. Ritland, the vice commander of the Ballistic Missile Division.

By all accounts, the two worked well together and got things done. Bissell had firm control of Corona, but he, Ritland, and others communicated with a chat and a handshake instead of directives and memos. "Imprecise statements of who was to do what permitted a range of interpretations; however, vague statements of responsibilities caused no appreciable difficulties in the early years of Corona," reports *The Corona Story*, a history of the program by Frederick C. E. Oder, James C. Fitzpatrick, and Paul E. Worthman published by the NRO and declassified in 1997. "The organization was small and had a single concern: producing a reconnaissance satellite. Much later (1963–65) those loose statements were analyzed more parochially and became a source of friction between the CIA and [the Department of Defense]."

President Dwight Eisenhower ordered the creation of the Office of Missile and Satellite Systems within days of the first successful Corona flight. Eisenhower, wary of inter-service rivalries, wanted the OMSS to coordinate and streamline Corona and follow-on space reconnaissance programs. The office was supposed to ensure that such programs were national in scope rather than serving the narrow needs of one or two military services—and he wanted it run by civilians. Ike insisted that Corona and its successors disappear in the ultra-secret world. No sense in rubbing sensitive Russian noses in the fact that many of their deepest secrets were being laid bare.

The OMSS was superseded without ceremony on September 6, 1961, by the National Reconnaissance Office. Its creation formalized an agreement worked out earlier by Bissell and Undersecretary of the Air Force Joseph V. Charyk during the Idealist-Oxcart-Corona partnership. The NRO was to be run by two civilians: the undersecretary of the Air Force and the CIA's deputy director for plans, both "acting jointly" for the benefit of all the services. That meant buying satellites, supervising their design and development, and operating them. With the arrival of the Kennedy administration and some predictable changes in directors, Bissell departed, and Charyk became sole director of the NRO. He created three separate domains: program A, to develop Air Force satellites, Program B, to develop satellites for the CIA and run the agency's air operations, and Program C, for the Navy's ocean reconnaissance satellites. A fourth, Program D, covered aircraft. Creation of the fiefdoms would lead to intense competition, some of it brilliantly constructive. But some was intensely destructive.

The CIA-Department of Defense directive establishing the NRO assumed that the informal style of doing things would continue. It made no reference to a single director. After Bissell left government early in 1962, the reconnaissance hierarchy, deprived of his harmonious presence, became mired in a conflict between the Department of Defense, the Air Force, and the CIA. If an intimate look at one family can portray an epoch, as Dickens and Tolstoy believed, then events within the NRO serve as a telling portrait of the U.S. intelligence community during the cold war and its aftermath.

From the beginning, the NRO was cloaked in utmost secrecy. Its cover was the Pentagon-based Office of Space Systems. It drew its personnel almost exclusively from other organizations, notably the Air Force and the CIA, and almost everybody in Room 4C956, the NRO's tightly protected sanctum in the Pentagon, was borrowed from someplace else. Even the logo on its letterhead (a spherical satellite that ironically resembled Sputnik orbiting Earth) was classified. Mere mention of the organization's name was absolutely forbidden. Officially, the National Reconnaissance Office did not exist.

The NRO's subsequent history was marked by extraordinary spy satellites funded by huge, hidden budgets and developed by scientists, engineers, and administrators who formed a cat's cradle of daring held taut by technical brilliance, bitter competition, and intrigue. The internal wars were caused by sharp differences over how the reconnaissance "product" was to be used, how the satellites were to be procured and operated, and how power in the NRO itself was to be allocated. It all boiled down to seizing and protecting turf that was valuable both economically and politically. "The Air Force was driven early by what was going to be instantly usable for war-fighting," says Admiral Bobby R. Inman, a soft-spoken former director of naval intelligence, the National Security Agency, and deputy director of the CIA. As Inman sees it, the airmen wanted information on enemy deployment—its order of battle—and what it took to win a war. The Air Force believed, as did the CIA and successive presidents, that the best way to prevent a war was to acquire excellent intelligence. The difference had to do with focus.

"The CIA [was driven] more by what was going to give information on unanswered questions—what would facilitate moving forward on arms control, as an example," Inman says. Bud Wheelon, who was the CIA's first deputy director for science and technology from 1963 to 1966 and ran the agency's spy satellite and aerial reconnaissance programs, agrees. "It was a roles and missions fight," he says. No CIA operative was ever going to be sent to bomb Vladivostok or shoot down MiGs. The agency's job was to produce long-term estimates of Soviet and other potential enemies' strategic capabilities.

An example of the continuing conflict between the two priorities was evident as recently as January 1991, just before the Persian Gulf War. For a period of four days, General Norman Schwarzkopf, commander of the coalition forces, monopolized reconnaissance satellites to map the area in Iraq where his troops would engage the enemy. That angered his counterparts in the other services and in the CIA.

Satellite procurement was another battleground. The CIA had very flexible procurement rules, moved money quickly, had close working relationships with contractors, and took chances. That approach had worked famously during development of two spyplanes (see "That New Black Magic," Dec. 1998/Jan. 1999 and "The Oxcart Cometh," Feb./Mar. 1999). The Pentagon was buried under mountains of procurement rules and, in Inman's view, was under enormous pressure from Congress not to make mistakes. (The spooks' mistakes were more easily hidden.) The agency, somewhat arrogantly but justifiably, thought it deserved the right to call the shots on spy satellites and the aerial reconnaissance programs. Inman notes that

the CIA had a fundamental stake in intelligence and was therefore doubly determined to control the system because, to use his word, it was an end "user."

That led to disagreement over how the NRO was to be run. Charyk, the first director, believed that spying from space ought to be controlled by the NRO—his office—because a tidy and efficient setup prevented anarchy. He wanted tight control from the top—a "chief executive officer" approach.

Herbert "Pete" Scoville Jr., who succeeded Bissell but did not enjoy his clout, was just as determined that the CIA be the master of the intelligence-collecting house because that was the agency's inherent responsibility. Scoville and his successor, Wheelon, took what can be called a "chairman of the board" approach: The NRO should loosely preside over its various constituencies, let the CIA tell the satellite contractors what was needed, and give them plenty of money. He and Wheelon fought with both Charyk and Charyk's successor, Brockway McMillan, who arrived in March 1963.

The security cover under which the NRO operated disguised the fact that its director was the special assistant for reconnaissance to the new Secretary of Defense, Robert McNamara. It seemed a sensible idea to locate the office within the Air Force section of the Pentagon and provide cover for the NRO staff members with Air Force designations. The idea backfired, in part because the personalities changed, but also because the CIA had been reorganized after Bissell left. Now the CIA began to complain openly about the way the NRO was run. The Corona Story recounts: "It became convenient for a CIA representative to complain to Secretary McNamara about the offenses 'of the Air Force'; it would have required a good deal of courage to substitute the words 'of your office.' "

Scoville, who technically represented the CIA in the NRO and was in charge of Program B, had delegated that assignment from the beginning of his tenure in 1962 and absolutely refused to work on the NRO's premises in the Pentagon. "By late October 1962, he [Scoville] and Charyk were no longer willing to talk directly to one another; written correspondence from one to the other, even of the most formal kind, stopped shortly thereafter," according to Robert L. Perry's *Management of the National Reconnaissance Program, 1960–1965*, another recently declassified NRO history. Scoville had become convinced that the NRO was an instrument of the Air Force aimed at pirating Corona and other CIA programs. Lacking support from John A. McCone, who had replaced Dulles as director of central intelligence, he grew increasingly weary and disillusioned and left the agency in June 1963.

But Pete Scoville was mistaken about collusion between the NRO and the Air Force. Soon after McNamara became secretary of defense in early 1961, he began to cut Air Force programs. Steel-willed, he tried to move an unsuccessful Air Force satellite program called Samos, and the Air Force's supporting role in Corona, to the NRO. The air staff felt betrayed. The Air Force and the NRO both operated within the Department of Defense, but that did not make them allies. "So, from the beginning, the NRO was an abomination in the eyes of the Air Force and Air Force officers selected to man the NRO knew that they did so at their own career

risk," recounts *The Corona Story*. Ironically, the account reports, a stint in the NRO could damage the careers of spies as well as airmen, since each side thought the NRO was in the other's political pocket. The air staff "looked on the NRO group as a not-quite-respectable collection of dissenters under the thumb of the CIA," with the result that Air Force officers who were "wholly loyal" to their NRO responsibilities sometimes felt that the "regular" Air Force had cast them out. Likewise, at least one CIA staffer who was assigned to the NRO and embraced its spirit found himself effectively frozen out of his own agency. "To be assigned to the NRO in any capacity, particularly in the troubled days between 1963 and 1966, was not uniformly looked on as a wholly happy circumstance," stated NRO historians in *Management of the National Reconnaissance Program, 1960–1965*.

The Navy was in the fray too, according to Inman. The sailors had their own fleet of spacecraft to handle communication, navigation, ocean reconnaissance, and other orbital chores. The Navy had wanted its Naval Research Laboratory to design and build satellites for programs such as White Cloud and Clipper Bow. "The NRO wanted to make sure that they were all commercially done," Inman says.

Program C, the Navy's ocean reconnaissance operation, reacted to the maelstrom by distancing itself from the NRO and pretty much going its own way, though Martin Marietta eventually got a contract for surveillance satellites. Wheelon, who at 23 had gotten a Ph.D. in physics from the Massachusetts Institute of Technology, replaced Scoville in 1963. Like Bissell and Scoville, he saw space reconnaissance as a valuable intelligence tool and told McCone as forcefully as he could that the agency had to play a pivotal role in the program—that strategic reconnaissance was primarily the agency's job.

Since the old intimate partnership with the Air Force was ancient history, Wheelon advised his boss, competition was the only alternative. McCone was already coming to the conclusion that the CIA had lost its influence within the NRO during the Scoville years, but the NRO had only increased its hold over satellite reconnaissance during that time. Something had to be done to get the CIA back in the satellite business, but the agency would have to do better than Corona. Now spoiling to compete, McCone got the ear of Jerome Wiesner, President John F. Kennedy's science advisor, and the highly influential "Din" Land, both of whom supported the CIA.

The tumultuous period from 1963 through 1965 saw the greatest breakthrough in space espionage since spy satellites started flying. First called Kennan and later Crystal, the famous KH-11 satellite sent imagery in near real-time—virtually as an event occurred. The KH-11 had its genesis in an improbable convergence of Soviet ballistic missiles and American football. On an autumn Sunday in 1963, Wheelon sat in his living room in Annandale, Virginia, watching a football game broadcast from San Francisco. He recalled that not one useful photograph had been obtained by Corona during the missile crisis in Cuba the previous October. By the time the returning film capsules had been snatched in mid-air, their film sent to Eastman Kodak in Rochester for processing, and the pictures forwarded to Washington for analysis, the crisis was

over. It struck Wheelon that if an NFL game could be transmitted live from San Francisco, so could imagery from the Soviet Union and elsewhere.

Wheelon would need the newly invented charge-coupled device, then being developed at Bell Labs. A CCD is an electronic retina: a mosaic of many thousands of tiny light sensors that is no bigger than a postage stamp. CCDs convert photons of light to electrical signals that can be transmitted digitally. It took 13 years before the first Kennan was forward-passed into orbit. Part of the delay involved engineering, since the Greyhound bus-size spacecraft was fantastically complicated. But as usual, part was political.

A few months before Wheelon's football revelation, the Air Force tried to leapfrog the CIA by sending up Gambit, an advanced bucket-dropper like Corona but with outstanding resolution on the order of 18 inches. Kennan, the CIA's entry, had that kind of resolution and better, but it also had the tremendous benefit of sending imagery right away. Kennan therefore threatened Gambit, and that set off yet another bruising conflict. The Air Force reacted by trying to orbit Frog (for "Film Readout Gambit"). The idea was to scan Gambit imagery with an older vacuum tube video camera, but transmission from orbit was notoriously poor, which is why Kennan used CCDs.

Frog also had to fly low to get the clearest possible pictures of the target, but that made it more difficult to maintain line-of-sight radio contact with its receiving station. The spacecraft could operate only a few hundred miles inside the Soviet Union, and receivers to collect its imagery would have to be set up like a fence of antennas encircling the Iron Curtain. The advantage of using satellites instead of airplanes to get deep, complete coverage would be lost. The myopic Frog soon croaked.

The Air Force didn't have a monopoly on harebrained ideas, however. The CIA decided that the ultimate spy satellite should be able to do everything. It therefore invented one that combined imaging, including infrared, and signals intercept capability in a single colossally large and horrendously expensive vehicle. Even before it was killed on the drawing board, its many detractors contemptuously dubbed it "Battlestar Galactica."

Alexander H. Flax, the assistant secretary of the Air Force for research and development, succeeded McMillan as the NRO's third director on October 1, 1965, and stayed until March 1969. Flax concluded that the only way to get real-time imagery from deep in the heart of Russia was to beam it up to a second satellite, which would relay the pictures to Earth. A look at a globe of the world showed that the only feasible way to send imagery from the Soviet Union to the United States was by using a relay satellite in an elliptical orbit thousands of miles above the top of the planet, giving it 12 hours or more of "hang time" to collect the imagery and forward it home. This was done by a spacecraft known as SDS, for Satellite Data System, which was developed in close conjunction with Kennan to form a compatible team.

Another brilliant development during the 1960s was Rhyolite, a satellite designed to listen to telemetry coming from Soviet rockets and ballistic missiles as they lifted off their launch pads. Telemetry at launch—information about fuel flow, exhaust pressure, turbopump

operation, guidance systems, and other vital signs radioed to the engineers—provides a complete picture of the missile's performance.

The CIA needed to intercept the telemetry just before and during liftoff. The solution was to park a satellite with a huge antenna over the launch site and eavesdrop on the telemetry, soaking it up on recorders like a mechanical sponge. The best place to do that was at geosynchronous altitude, roughly 22,300 miles up, where the satellite would remain parked over the same spot. But capturing a signal from so great a distance required a huge bowl-shaped antenna. That created another problem: how to get the thing into a launch vehicle's small upper stage. A contractor solved the problem by folding the antenna like a sophisticated parasol. Rhyolite was built by TRW and first launched in 1970. It was sensationally effective at listening to missile launch telemetry and monitoring thousands of radio conversations simultaneously.

While the rivalries of the early '60s resulted in solutions that were often brilliant, by 1965 the atmosphere within the NRO and the relationship between Defense and the CIA had deteriorated so badly that McNamara and McCone finally agreed to establish a National Reconnaissance Executive Committee chaired by the director of central intelligence and reporting to the secretary of defense on the NRO's research, development, and budget. If the DCI disagreed with the secretary of defense, he could take the matter to the president. At the same time, McNamara and McCone accepted three written peace agreements as well as "monitors" from each camp to make sure the terms of the agreements were being met. That helped ease the tension. So did Al Flax, who firmly believed that the Air Force and CIA were complementary assets. He too tried hard to reconcile their differences.

A final agreement was signed on August 11, 1965, by Deputy Secretary of Defense Cyrus Vance and Admiral William F. Raborn, the new director of central intelligence. It established the NRO as a separate agency within the Department of Defense. Significantly, it also substantially reduced its director's authority and made the CIA responsible for establishing intelligence collection requirements and priorities. The CIA had won.

What was remarkable was that the convulsive power struggles of the 1960s spawned a highly effective system. However contentious the participants were in the beginning, the National Reconnaissance Program forced them to focus on the overall intelligence problem in an extraordinarily creative (and financially lush) environment.

In the 30 years after the Vance-Raborn agreement, the NRO's cover of secrecy was gradually torn away until it was in tatters. On September 18, 1992, a tersely worded, single-page "Memorandum for Correspondents" announcing the "declassification of the existence of the National Reconnaissance Office" was issued by the Department of Defense: "There is a National Reconnaissance Office..." it read. Two and a half years later, President Clinton signed an order declassifying Corona, which had flown the last of its 145 missions on May 25, 1972. In 12 years of operation, the satellites had sent down 167 film capsules with more than two million feet of film—some 800,000 pictures. A party of sorts to celebrate Corona's public

unveiling was held at the National Air and Space Museum in Washington on May 24, 1995. One of the host sponsors was the NRO.

Coming in from the cold required substantial adjustment by the NRO, some of it discomfiting to its veteran shadow people. With the need for the organization's activities greatly reduced, its estimated \$6 billion annual budget (larger than the CIA's) began shrinking. Then, in 1994, the Washington Post reported that the NRO was abandoning its lair in the Pentagon for luxurious new \$300 million digs in Chantilly, Virginia, almost 30 miles from Washington. The four crisp, slate-blue, glass-and-steel buildings off Lee Road could pass for an upscale corporate headquarters. A year later, Congress went into an uproar when the Post reported that the NRO was "hoarding" more than \$1 billion in unspent satellite funds.

It was an unfair hit. Spy satellites' lifetimes, and therefore replacement rates, are determined by how much fuel they use and by their ability to generate electrical power. With the cold war at an end, the requirement to maneuver was reduced, so the satellites used less fuel and therefore lasted longer. That meant fewer replacements had to be launched and unspent money accumulated. Then, in June 1996, it was disclosed that the NRO had "lost track" of more than \$2 billion ("more than the annual operating budget of the State Department," The New York Times reported). It was all enough to make the old hands long for their collective cloak.

Left unreported was the fact that the NRO had worked its way out of the old system. After the breakup of the former Soviet Union, programs A, B, and C were combined into a single group. Borrowing a page from Darwin—adapt or die—the NRO joined the CIA in trying to adjust to a world without a Soviet Union. As it had once embraced absolute secrecy, it now resorted to the intelligence world's most disagreeable activity: PR. It opened an Office of Corporate Communications, sent speakers to talk to students at the nearby Cub Run Elementary School, and even started a Web site (www.nro.odci.gov). In this, it joined the CIA, whose own Web site (www.odci.gov/cia) even has a "Kid's Secret Zone."

Recently published brochures note that technology developed by the NRO has led to high-definition television, mammography screening for breast cancer, and other innovations. The new NRO said it wanted "partnerships with customers and industry" and started shopping for them. Today the National Reconnaissance Office has a new clientele, new products, and a new set of rules that enable it to use information from satellite imagery to assist federal agencies. Assessing natural disasters for relief operations, identifying toxic waste sites, monitoring oil spills, surveying land use, mapping difficult terrain, and monitoring mining operations are all ways the NRO has recently used its spy satellites as Earth monitors. Richard Bissell, who died in 1994, had practiced economics before he practiced espionage. He undoubtedly would have nodded and smiled approvingly.

How Things Worked

Today, the development of spyplanes and satellites normally begins within the United States Intelligence Board, whose members represent all of the nation's intelligence organizations. The first step in the creative process, as in other kinds of engineering, is defining the requirement, which is framed by the board and sent to the NRO, where scientists and engineers mull over ways to fulfill it. Then they share their ideas with those who will use the intelligence and with the contractors. This interactive process involves the CIA, the military (the Air Force launches and controls satellites, while all of the services need the intelligence), and prime contractors such as Lockheed Martin, TRW, and Hughes Aircraft. The NRO pays for the spacecraft through secret budgets on the Department of Defense's books and operates them through the Air Force.

"The agency brought to the business a group of people, like myself, who were former industrial people who knew how the process worked, who weren't afraid of technology, and who were prepared to engage in a dialogue with the contractors to make the various choices," retired CIA officer Bud Wheelon explains. Many of the NRO staff come from contractors, universities, or applied physics labs and know as much about spacecraft construction and operations as the contractors do. "When a decision had to be made, or a direction chosen...it was all done by the agency people and then it shifted to the contractors," says Wheelon. The CIA is supposed to come up with breakthrough concepts to solve specific problems. The contractors add their own ideas and then develop the finished product. Insiders have characterized the contractors, the NRO, and its constituents as a very small, cozy group; some have described the relationship as incestuous. The prime contractors, in effect, are as dependent upon the NRO as the NRO is on them. "Occasionally the companies would come up with new ideas and new approaches and would come in to offer some totally different way you could do something," says intelligence veteran Bobby Inman. Usually there was enormous resistance, he says, describing the NRO attitude as "Stay with what we're telling you to work on; don't come and tell us about other things you could do." He adds: "The companies were not reluctant to make end runs to higher places" to peddle their wares.

Future Shock

Not everyone at the NRO believes in the new world order. Former CIA director James Woolsey's warning that the dead Soviet dragon has been replaced by a garden of poisonous snakes is taken as gospel, as is the notion that the dragon may not be dead. So what will the United States need to know into the 21st century?

Although the need to collect technical intelligence remains—monitoring missile tests in North Korea, for example—the new threat is moving, spreading, and becoming more devious. Terrorism and cyberwarfare, or information warfare, are high on the list of dangers over the horizon. In a new project called 20/20, the NRO is drawing on experts in academe and industry to predict what the world will look like 20 years hence. The idea is to create as clear a picture as possible not of mere trends but of new threats so that countermeasures can be readied.

New systems and spacecraft are needed. The Future Imagery Architecture (FIA) program will make real-time imagery available to military forces in combat. The challenge is to get pictures to the troops and filter out all the irrelevant data. That's the responsibility of the new National Imagery and Mapping Agency. And as the threat changes, the satellites will have to operate in new and different orbits.

An Integrated Overhead Sigint Architecture program is the signals intelligence equivalent of the imagery program. It will intercept communication between terrorist cells, pull in telemetry from ballistic missile test programs, and provide warning of nuclear tests. If the NRO's Directorate of Signals Intelligence doesn't have the right spacecraft (a Rhyolite successor, for example), then the Directorate of Advanced Science and Technology has to dream one up and ask potential contractors to submit proposals.

Thanks to dramatic advances in miniaturization, the imaging satellites themselves will become smaller, which will make them cheaper to build and to launch. The laws of physics will remain immutable: No high-resolution close-look telescope is going to fly in a package the size of a wastebasket. And since imaging satellites last only as long as their maneuvering fuel, it seems certain that new ways of changing their orbits, including the use of tiny ion thrusters, are under study.

It also seems certain that satellites are going to have upgraded infrared capability, high-definition radar for night and all-weather imaging, and the ability to stare at one spot. A telescope staring at a place on Earth from 22,300 miles out would have far better resolution than one on Earth looking 22,300 miles in the opposite direction. That's because of the "bottom of the ocean effect": There is far more distortion looking up at the world from the bottom of a swimming pool than there is looking at the bottom of the pool from a diving board. Staring at one place for days or weeks is not farfetched. A Hubble Space Telescope-sized optical system, looking down instead of out, should be able to do the job. The Hubble uses the same basic optics as its NRO cousins, Hexagon (or "Big Bird"—the KH-9) and Crystal, the old KH-11. All three satellites were sired by Lockheed Missiles and Space Company. Perhaps the most telling sign that things have changed was the surprising award in early September of the FIA contract to Boeing, thereby ending a relationship with Lockheed that dated back to 1958. One reason cited for switching to Boeing was the need to contain costs. And civilian satellites with three-foot resolution offer the promise of round-the-clock satellite service to all potential users—like a kind of public utility. The NRO, for one, will never be the same.