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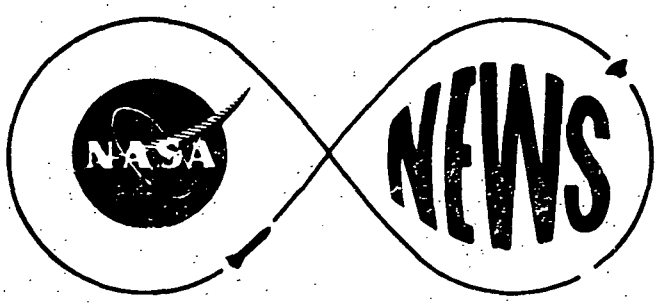

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SPACE ACT SIGNED 15 YEARS AGO

Fifteen years ago today, President Eisenhower signed into law the National Aeronautics and Space Act of 1958. Two months later, on Oct. 1, NASA officially came into being.

Prior to this time, research into rocket technology in the United States was fragmented among the military services and NASA's predecessor the National Advisory Committee for Aeronautics (NACA).

Russia's Sputnik I, launched Oct. 4, 1957, put 184 pounds of scientific instruments into orbit and seriously challenged the United States' reputation for technological superiority. Congratulatory messages had hardly stopped pouring in to the U.S.S.R. when the Soviet on Nov. 3 launched another Sputnik with six times the payload of the first one. This one also carried a dog.

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From the public and official concern arising from these events came the realization that the United States needed a space program built on a foundation of well-formulated basic policy and planning, effectively organized, adequately funded, and given high priorities.

The outcome was a civilian space agency, the National Aeronautics and Space Administration, whose policy was "that activities in space should be devoted to peaceful purposes for the benefit of all mankind."

When NASA marks its 15th birthday on the first of October, the U.S. will have orbiting the Earth every 90 minutes a 100-ton space station, Skylab.

By contrast, this nation's first satellite, Explorer 1, launched Jan. 31,1958, weighed just a little over 30 pounds. For all its small size, Explorer 1 was scientifically productive. It discovered the Van Allen Belts, areas of high energy particles that surround the Earth.

Skylab manned by three crews of three astronauts each for periods of up to two months, is conducting solar astronomy, Earth resources, medical and other scientific and technical investigations.

Skylab is gaining in space new knowledge for the improvement of life on Earth. Its investigations and experiments will help develop new methods of learning about the Earth's environment and resources and new ways to evaluate programs directed at preserving or enhancing those resources throughout the world.

Summaries of major programs follow:

MANNED SPACE FLIGHT

The first United States' manned space flight program, Project Mercury, was established in October 1958 and two and one-half years later Alan Shepard became the first American in space. Aboard his spacecraft Freedom 7, Shepard flew a suborbital flight of 15 minutes, successfully landing in the Atlantic Ocean 302 miles down range from Cape Canaveral.

On February 20, 1962, John Glenn became the first of four Mercury astronauts to be placed in Earth orbit accomplishing the major goal of the program.

Following Mercury, the Gemini Program extended manned spaceflight activities by development of a two-man spacecraft designed for long duration flights. From March 1965 to November 1966, ten manned Earth orbital Gemini flights were flown for missions of from 5 hours to 14 days.

In the late sixties and early seventies, the Apollo lunar landing program dominated the space program. In December 1968, with the flight Apollo 8, man first circled the Moon and returned safely to Earth. Starting with the flight of Apollo 11 and Neil Armstrong's first step on the lunar surface July 20, 1969, twelve astronauts were eventually to explore the Moon until December 1972 when the flight of Apollo 17 officially ended the program. But the five scientific stations established on the Moon continue to relay information to Earth and it will take years to completely analyze the hundreds of pounds of lunar material returned to Earth.

Following 1973, the year of Skylab, the next major manned flight program is the joint Apollo-Soyuz Test Project -- the first manned international space effort. American astronauts, in an Apollo spacecraft, will rendezvous, dock, and visit an orbiting USSR Soyuz spacecraft. In turn, Soyuz crewmen will pass through the docking module and return the visit to Apollo. Target date for the launch is July 15, 1975.

Toward the end of this decade, the Space Shuttle will be ready for its major role in space. Needed to make space operations less complex and less costly, the reusable Space Shuttle is designed to carry out various missions in Earth orbit at a fraction of the cost that present day launch vehicles demand.

SPACE SCIENCES

Through the use of unmanned spacecraft, the exploration of space has provided man with a better understanding of his own planet and an opportunity to see other planets, stars, and galaxies, unhindered by the Earth's obscuring atmosphere.

Earth-orbiting satellites have discovered and mapped in detail the highly complex magnetosphere surrounding Earth and the effect of solar radiation on Earth's ionosphere and atmosphere. Other spacecraft have looked far into space to study ultraviolet, infrared, X-ray and gamma-ray radiation to learn more about stars and galaxies and little-understood pulsars, quasars and black holes.

Instrumented spacecraft have orbited Mars and have been sent towards Venus and Jupiter, contributing to an understanding of those planets and why they are different from the planet Earth. Other far-ranging spacecraft have mapped the Moon in detail and observed the Sun and the solar wind from widely separated points in the solar system.

In NASA's first 15 years, some 300 satellites have been sent into Earth orbit and interplanetary space. Milestones include:

- Rangers, Surveyors and Lunar Orbiters: These unmanned spacecraft launched in the early 1960's paved the way for man's first landing on an alien planet, returning thousands of closeup pictures of the lunar surface and scientific data on its composition.
- Mariner: A family of planetary probes designed to investigate Mars and Venus. Orbiting the Red Planet in 1971, Mariner 9 provided man with his first closeup look, returning more than 7,000 pictures and other important scientific information. The information obtained by Mariner 9 has provided valuable data for planning the 1975 landing of a Viking life-detection laboratory on the Martian surface.
- Pioneer 10: Launched in 1972, Pioneer 10 will make the first reconnaissance of giant Jupiter in December, 1973, before becoming the first manmade object to escape the solar system. Pioneer 10 completed the first successful passage through the asteroid belt during its one-billion-kilometer (620-million-mile) journey. A second Jupiter probe, Pioneer 11, is scheduled to reach the planet in December 1974.

APPLICATIONS

In the area of direct benefits to mankind as a result of space activity, the groundwork was done in the early '60's with passive and active communications satellites and early meteorological spacecraft.

The Echo balloon satellites launched in 1960 and 1964, and seen by more people than any other man made objects in history, were some of the early stepping stones to the billion dollar global commercial communications satellite industry. They were followed by the Telstar, an active communications repeater, developed by American Telephone and Telegraph Corporation in 1962 and 1964, and NASA's Relay satellites in 1962 and 1964. With the launching of the synchronous orbit satellites, Syncoms 1 and 2 in 1963, it was apparent that the commercial capability required for the Communications Satellite Corporation, incorporated in 1962, was available.

NASA is now phasing out of its conventional communications satellite research and development activity, leaving future endeavors to private industry. The last and largest communications satellites developed by NASA, ATS-F, will be launched next spring to pioneer in even more advanced areas of communications technology with experimental broadcasts of instructional and educational television to remote regions and experiments dealing with such things as air and sea traffic control and satellite-to-satellite communications.

The first meteorological satellite, TIROS-1, was launched in 1960, followed by a rapid succession of similar spacecraft in following years. These resulted in the establishment in 1966 of the first operational meteorological satellite system. Weather satellites have observed every major storm or hurricane since the launching of the first TIROS, and improvements in such spacecraft flow from research performed with NASA's Nimbus and Applications Technology Satellites.

In 1972, the first Earth Resources Technology Satellite, ERTS-1, was launched and continues to return information of great importance in managing the Earth's resources and observing its environment. More than three hundred investigators are using data from this spacecraft in experimental applications to these fields. Congressman James W. Symington, Missouri, a member of the House Committee on Science and Astronautics said of ERTS-1, "...we are persuaded (the ERTS project) will help mankind solve some of the most pressing social and economic problems from one end of Earth to the other..."

More information in this area is forthcoming from the Skylab missions now underway with photos and data on earth resources brought back by the Skylab astronauts from a battery of even more sophisticated Earth observation equipment onboard the orbiting workshop.

AERONAUTICS

The NASA continued the long and successful record of its predecessor agency, the National Advisory Committee for Aeronautics, in preserving the role of the United States as a leader in civil and military aeronautical technology.

The joint NASA/USAF/USN X-15 rocket powered airplane made its first flight in June 1959. The world's only manned aircraft capable of hypersonic flight, the X-15 flew to a peak altitude of 354,200 feet (67 plus miles) and a top speed of 4,520 miles per hour (Mach 6.7).

During the nearly 10 years of flight, the X-15 made major contributions to understanding the problems of manned flight, both in the atmosphere and in space, studied the effects of the extreme conditions of hypersonic flight on skin friction and thermal expansion, pioneered the use of ablative coatings, aided the efficient design of structures, and fulfilled its workhorse test-bed role encompassing approximately 40 wide-ranging experiments.

One of many NASA contributions during this period was the single-pivot variable-swept wing which allows efficient flight at both high and low speeds. This concept was first applied to the Air Force F-111 and has since been adopted for the F-14 fighter and the B-1 bomber.

The initial flight tests of the NASA-developed supercritical wing have successfully demonstrated that the new shaped airfoil does permit an F-8 aircraft to operate approximately 15 per cent more efficiently. These test results showed that the wing produces higher speed and greater range without increases in fuel consumption.

The U. S. Air Force contractors are currently designing two Advanced Medium STOL Transport prototype aircraft employing supercritical wing technology and also propulsive-lift concepts derived from NASA technology. The propulsive-lift concepts use engine exhaust air to provide additional lift to the aircraft permitting low approach and takeoff speed to facilitate short field operations. NASA's Quiet Propulsive-Lift Technology program promises to contribute significantly to reducing congestion and noise impact at existing civil airports and would enable use of smaller, more conveniently located quiet-ports near city centers.

NASA's experimental Quiet Engine Program, started in 1969, has demonstrated jet engine noise levels significantly below the Federal Aviation Regulation Part 36 requirement. Aircraft noise is currently constraining growth of civil aviation. The NASA quiet engine technology development program aims at making aircraft quieter and thus, more acceptable to the community environment.

TECHNOLOGY UTILIZATION

The enabling legislation establishing NASA in 1958 gave the space agency as one of its missions that of making certain that any new technology developed by the agency would be made readily available "for the peaceful use of mankind" -- for all potential users in the United States and worldwide -- whether in industry, in subdivisions of government, in schools and universities, wherever such peaceful use can advance the quality of man's life and his effective solution of his problems.

NASA's Technology Utilization Office has been assigned this task. The office currently operates six Regional Dissemination Centers or technological data banks located around the country. By consulting any one of these computer-controlled data banks, a potential user has ready access to all of the other five in getting answers to his technical problems.

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The dissemination centers contain more than one million individual publications dealing with technology over a wide range of disciplines. These materials represent new developments and inventions resulting from more than $45 billion worth of contracts with more than 400,000 separate companies during NASA's first 15 years. There is, in addition, a vast body of new technology developed by the space agency in its own government-operated laboratories and research centers.

Since 1970 more than 2,000 firms, ranging from small businesses employing less than 50 people to very large industrial complexes, have used the services of the Dissemination Centers annually.

The field of medicine has put more NASA-developed technology to use than any other discipline--mainly because of space age advances in miniaturization and sophisticated electronics circuitry.

Some notable examples of medical benefits:

A compact, fully automatic gas analyzer is now on the commercial market. The gas analyzer measures the composition of air breathed in and exhaled from the lungs as an aid in monitoring pulmonary and cardiovascular activity in human patients. It affords prompt information on human respiratory and metabolic functions, previously unavailable or too time consuming to obtain.

In hospital intensive care units, the instrument can be used to monitor the breathing of acutely ill patients, signaling the need for changes in therapy more efficiently than previous methods. In surgeries, the anesthesiologist can monitor the patient's progress, checking inhaled and exhaled concentrations of anesthetic gas.

Ultra-clean laminar air-flow techniques developed by NASA for assembling spacecraft and their components are helping surgeons avoid infection in hospital surgeries. Ultra-fine filters purge dust and particles from the air during surgery, and the doctors and surgical teams wear helmets resembling those worn by astronauts, plus specially treated surgical garments that bacteria cannot penetrate. The number of these special "clean room" surgeries has risen from less than 50 two years ago to more than 200 today.

Eye-operated switches, devices operated by breath controls, and ultra-sensitive pressure devices have been incorporated in a specially-equipped hospital room in a Huntsville, Alabama, hospital, designed to test various applications of NASA-developed technology in aiding quadriplegics (patients with no use of their arms or legs).

A patient unable to use either his hands or feet may one day be able to control the total environment of his room using devices developed initially for the space program.

Immobile patients in the room are able to open and close doors and windows, control room temperature, change radio stations, dial a telephone, adjust the position of their beds, signal the nurse at a remote station, turn pages in a book--and perform various other tasks necessary for their comfort and convenience.

Some of the other "spinoff" space benefits presently in daily use outside the aerospace field:

More and more nondestructive testing techniques developed by NASA are gaining widespread industrial use. A good example is a rapid-scan infrared tire tester being used daily by a major U.S. tire manufacturer. The ultra-sensitive infrared optical device affords a nondestructive testing method for checking out new designs in aircraft and automobile tires.

The device produces a real-time cathode ray tube picture of the heat in tires as they spin rapidly on the testing rig--up to 200 miles per hour in the case of automobile tires and as fast as 400 miles an hour for aircraft tires. The camera is capable of reading the heat from 600,000 points on a tire every second, presenting an infrared "heat picture" of the tire, in which flaws or hot areas appear as bright spots.

NASTRAN, a computer program designed by NASA to analyze the behavior of structures under stress, is now a design tool familiar to more than 1,000 American engineers outside the space agency. Hundreds of industrial firms, universities, laboratories and government agencies are using it to solve their structural engineering problems.

For example, front suspension and steering linkages in a line of American automobiles and light trucks are now being designed with NASTRAN assistance. NASTRAN analysis can also be applied in the construction of bridges, power plants, skyscrapers and airplanes.

Battery technology developed by the space agency is reaching the market daily in the form of better, longer-lasting battery power sources.

New successful lines of high-energy-output batteries appeared on the commercial market during 1972, providing sure, fast starts for portable power tools and sports equipment, thanks to battery technology originally developed by NASA.

These new products include both lead-acid and nickel-cadmium batteries, capable of being recharged 90 to 100 times faster than existing batteries. Compared with most commercial batteries requiring 14 to 16 hours for full recharge, the new batteries can be recharged in 15 to 20 minutes without damage to the cells. Some nickel-cadmium units can be recharged in as little as six minutes.

Another device benefitting average citizens daily is the "heat pipe" concept, developed jointly by NASA and our Atomic Energy Commission:

A self-contained, fully automatic heat recovery and transport system, the heat pipe was first used in NASA spacecraft and in cooling nuclear reactors. This highly efficient equipment can transport heat at approximately 500 times the rate possible with the best solid conductors, with minimal temperature loss.

The heat pipe has recently been applied domestically in recovering and recirculating heat from chimney flues, increasing the efficiency and economy of many types of home heating plants approximately 10 per cent. The firm developing this household application expects to market the device widely in the near future.

A heat pipe application now on the market and familiar to many housewives is a "cooking pin" for distributing heat evenly through meat during the roasting process. A heat pipe for lowering the lubricating oil temperatures in motorcycles is now being offered commercially.

INTERNATIONAL PROGRAMS

The first international cooperative satellite was launched in 1962. Called Ariel I, and developed jointly with the United Kingdom, it carried scientific ionospheric experiments.

In the following years NASA has conducted 18 cooperative satellite and probe joint projects with Canada, France, Germany, Italy, the United Kingdom and the ten-nation European Space Research Organization (ESRO).

Since orbiting the first foreign experiment on Explorer 20 in 1964, NASA has flown 25 international experiments on its satellites and spacecraft. Since its early development of communications satellites, NASA has successfully orbited 12 such spacecraft which form the Intelsat system of global communications.

The first cooperative sounding rocket launch in 1961 was a joint effort with Italy. Since then, NASA has participated in more than 790 such international sounding rocket projects.

From small beginnings NASA's international programs have -- over these years -- developed to the present stage when 94 countries and international organizations are cooperating with NASA in some form and NASA has entered into more than 500 agreements for international space projects.

Among other developments more than 350 foreign scientists have been involved in the analysis of lunar surface samples.

The European Space Research Organization has established a special project for the study and development of a Sortie Laboratory to operate as an integral part of the NASA Space Shuttle.

The Apollo-Soyuz Test Project, a joint US/USSR experimental mission to test compatible rendezvous and docking systems, is on schedule for a 1975 launching. Meanwhile, US/USSR working groups are exchanging results and defining coordinated joint projects in space science and applications.

In addition, tracking, communications, and data acquisition have been effected with the cooperation of 22 countries. Cooperative international aeronautics research is being conducted with four countries.

Promising cooperative ventures for the future include a satellite instructional television experiment with India and joint satellite projects with Canada, Federal Republic of Germany, Netherlands, Spain, and United Kingdom.

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