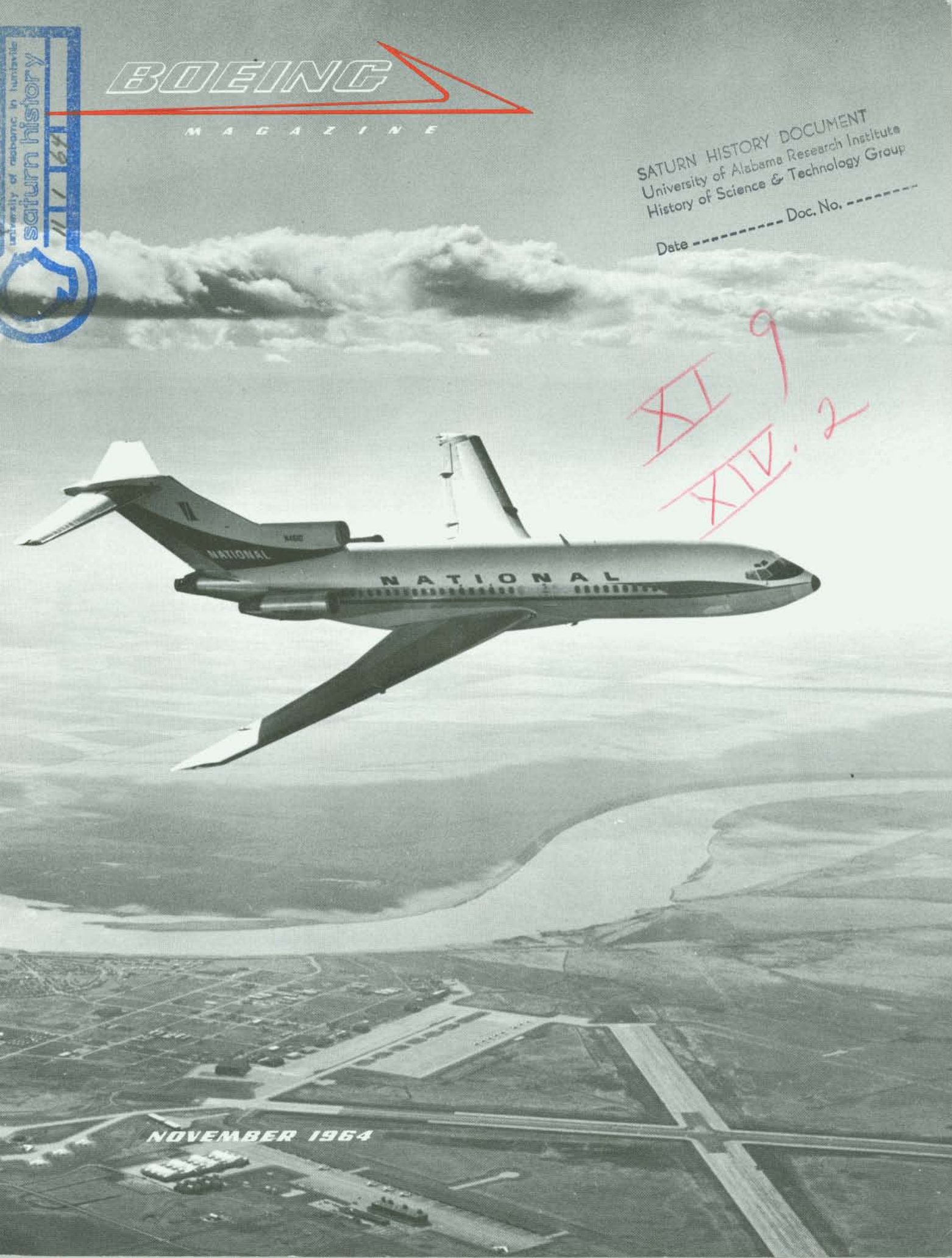
BOEING

MAGAZINE



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Editor: CHESTER CHATFIELD
Associate Editor: DARRELL BARTEE (Wichita)
Art and Production Mgr.: KEITH KINSMAN
Staff Artists: ALDEN METCALF, BILL HARCUS, PHIL VON PHUL

In This Issue

ON OUR COVER — A brand-new National Airlines 727 passes over Moses Lake in Eastern Washington during its maiden flight. This plane is the first of 10 727 jetliners ordered by the Miami-based carrier and is due to enter service later this month.

PHOTO CREDITS — Paul Wagner (cover, 14); Vernon Rutledge (5, 11, 15); Vernon Manion (6, 7); All Nippon Airways (7); United States Air Force (8, 9); Bob Zultowski (10); Thomas Cusick (12, 13); Jack Barkus (12); Byron Wingett (14).

THE BOEING COMPANY
HEADQUARTERS OFFICES
7755 East Marginal Way Seattle, Washington

THE BRIEFING

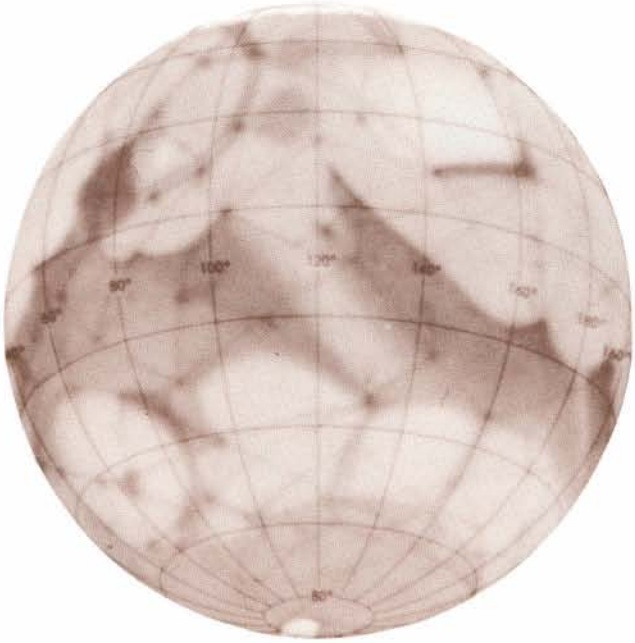
The National Aeronautics and Space Administration recently awarded two contract modifications totaling $14,754,418 to Boeing's Aero-Space Division to develop additional hardware and conduct a load-test program for the Saturn 5 first-stage (S-1C) booster. Boeing is under contract to NASA's Marshall Space Flight Center, Huntsville, Alabama, to develop, manufacture, assemble and test 10 S-1C boosters at Marshall's Michoud operation in New Orleans.

Under the first supplemental agreement Boeing will design, develop and manufacture parts for the S-1C umbilical connections and related hardware. These umbilical connections are lines conveying electricity, communications and other essentials to the vehicle until launch time. The second agreement directs Boeing to conduct a structural static load-test program for the S-1C.

The Turbine Division received a contract last month from AB Volvo of Sweden for a number of Boeing 502-10MA 300-horsepower turbine engines to be used as boost powerplants in the production version of a new Swedish Army tank. Prototypes of the Swedish "S" tank have been operating in trials for more than a year with Boeing turbine boost power. The 37-ton tank uses a multi-fuel reciprocating engine for cruise power and the turbine supplies added power for high speed.

The amphibious tank was developed under the direction of the Royal Swedish Army Ordnance Administration with the Bofors Company as main contractor. Volvo developed and will produce the vehicle's powerplant package. The Boeing engine was selected by Volvo because of its high power-to-weight ratio, ability to start readily in sub-zero weather, compact size, reliability and ability to burn a variety of fuels.

A Boeing-developed process for Teflon coating was licensed recently to the General Plastics Corporation of Bloomfield, New Jersey. The process, called metalized Teflon coating, produces a coating of Teflon over wear-resistant ceramic-metallic particles, providing great durability and resistance to scratching. Best known to the public as a cooking-ware coating which eliminates the need for grease, Teflon is the trade name for a Du Pont product noted for its non-stick properties.



Instruments landed on Mars would help solve

RIDDLE OF THE RED PLANET

By WILLIAM JURY

AN EXPLORER outbound from another planet could swing by the earth, take photographs with a camera system as good as our best, and never know more about life here than the fact that some vegetation existed.

The blue whale—largest of the world's creatures—could be cast up on a strip of beach and still escape identification in a picture taken from a couple of hundred miles up.

But if the camera and perhaps a microscope could be landed safely on earth, then the presence of man might be detected, and that of such tiny animals as mice.

It is no wonder, then, that earthlings about to embark on explorations of their own are giving serious consideration to a package of instruments which would separate from its parent satellite somewhere over Mars and descend for a closer look at what is there.

Object of this attention is a conceptual design for a spacecraft which would put instruments into orbit around Mars and on the Martian surface as well. The idea was developed by scientists and engineers in Boeing's Aero-Space Division.

Basically, the design is of a doubleheaded spacecraft. One portion would circle Mars. The other would land on the planet. The two vehicles, after they had separated, would be essentially independent of each other, although the orbiter would provide a back-up communication link by relaying the lander's signals.

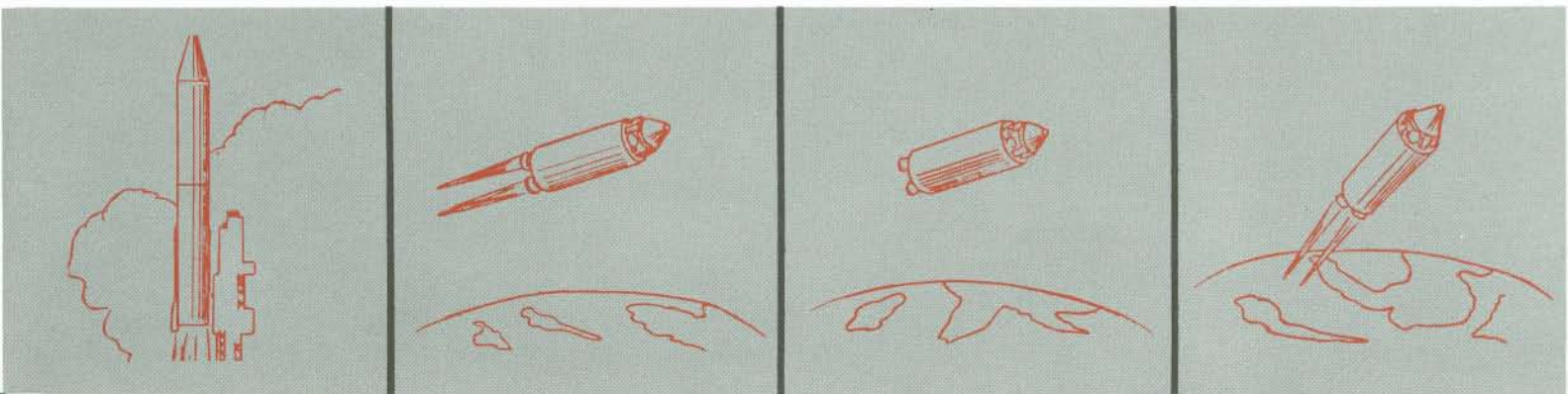
The orbiter, after retrorockets had injected it into an egg-shaped orbit around Mars, would report optical, magnetic and electric phenomena.

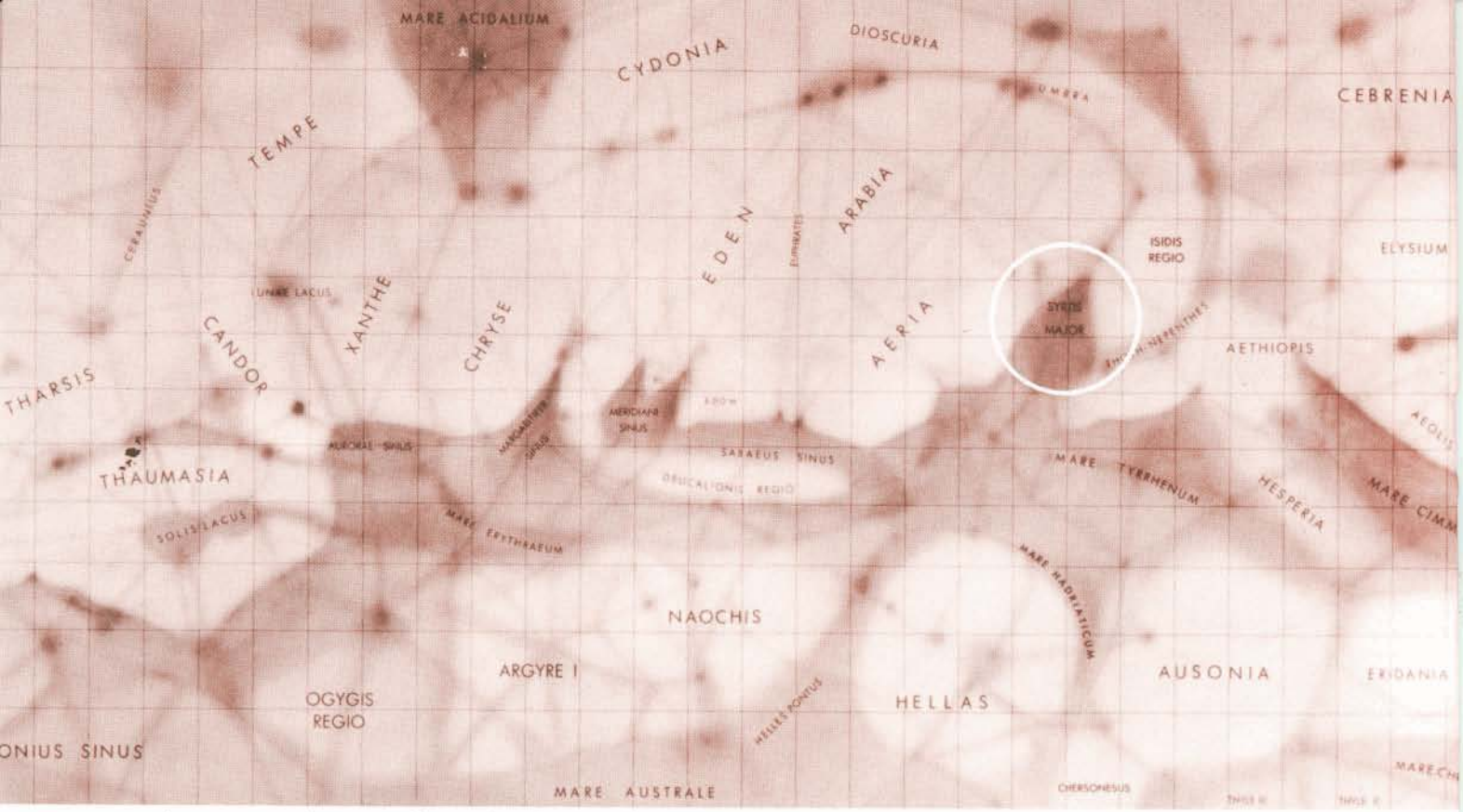
The lander, using aerodynamic braking, hypersonic parachutes and retrorockets to let itself down through the thin Martian atmosphere, would report back what it learned during entry and provide information about the planet's atmosphere.

Resting on its four legs, the lander would stand about six feet tall and its shape would follow closely the carafe-like lines of Project Mercury's capsule.

After a soft landing on Mars, the instrument-laden vehicle would go to work collecting scientific data. An automatic drill might bore into the Martian soil and extract a core sample for chemical analysis. The analysis could be performed automatically and the results signaled to the orbiter for relay to earth.

A camera could take close-up pictures of the planet's surface. A seismograph, tuned to record the





An unmanned spacecraft, equipped with life-detection instruments, could land gently near Styris Major, an area of Mars of prime interest to scientists.

slightest tremor, likely would be packed aboard the lander. Other instruments would take the temperature of Mars, recording the highs and lows as the planet passed from day to night and back to day. The slightest variations in the weather could be recorded by other atmospheric and meteorological equipment.

An experiment which might be performed by the lander was described a few years ago in a booklet published by the National Aeronautics and Space Administration:

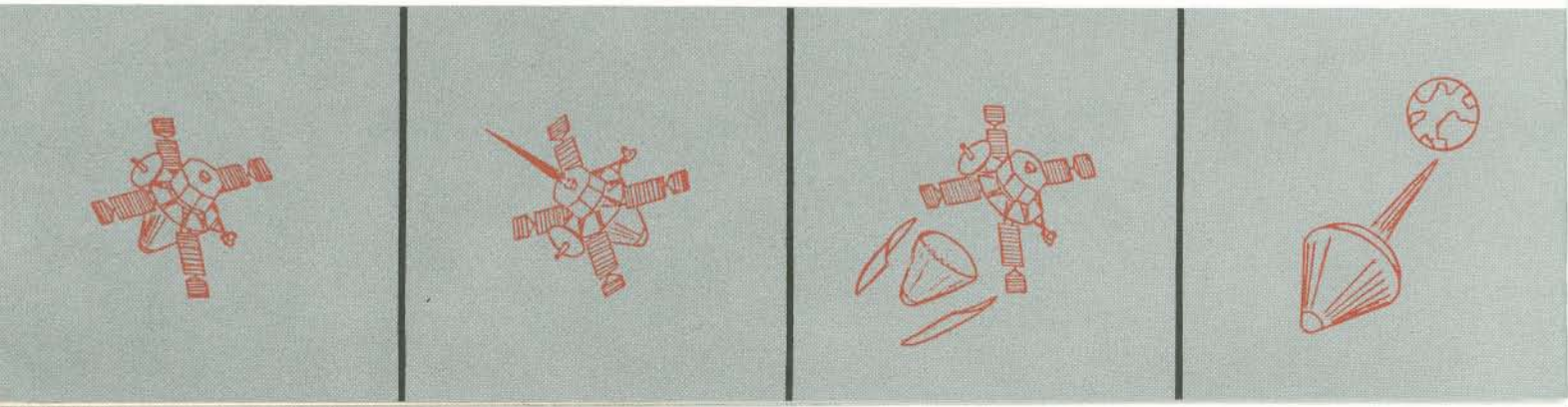
A piece of line, coated with a sticky substance, could be cast out of the lander, then reeled back in. Once inside the lander, soil particles picked up along the way could be doused with a sterile broth tagged with radioisotopes.

Should the Martian soil contain any living organisms, they should begin to grow within a few hours and produce a radioactive gas inside the lander. This gas would be detected by a tiny geiger counter, which in turn, would signal the news to scientists by a series of clicking noises.

Scientists don't expect to find supermarkets, rose gardens or grazing cattle on Mars. Life, if it exists at all, might be nothing more than simple molecules which haven't yet evolved into multicellular organisms. Or it might be chemically different life than we know, based upon new and presently unknown structures.

Dr. Frank S. Holman, head of the group which developed the Boeing lander-orbiter concept, says the spacecraft could be developed in time for the next favorable launch window in 1969. But, at the same time, he expresses doubt that it will be assigned a Martian mission before the early 1970s.

For one thing, there is concern among scientists that spacecraft will infect Mars with Earth's contaminants. And the lander, being relatively complex, would be difficult to sterilize using existing techniques.



"We'll have to wait for improvements in the art of sterilization to make the lander-orbiter mission attractive," Holman concedes. "But the launching of a passive, simply instrumented probe through the Martian atmosphere in 1969 appears wholly practicable, and would pave the way for missions involving more elaborate experiments."

Holman is one of those engineers who admits to being impatient with fly-by missions, especially when a margin of several years exists with which to work on something a bit more ambitious.

"Man should not be content in 1969 merely to send a spacecraft past Mars on a simple reconnaissance flight," Holman insists.

Mission objectives, he adds, should include a naked-eye view of a major portion of the planet. An orbiting instrument package—like the one conceived for the orbiter-lander mission—could keep watch over Mars for a long time, observing seasonal changes and the like. Another objective—and one which could be accomplished on the same flight—should be the determination of the planet's atmosphere through the use of a sterilized penetrating probe, Holman believes.

An orbiter-probe spacecraft could be ready for Mars mission in 1969, Dr. Holman (right) tells Boeing Vice-President Robert H. Jewett.

The passive probe which Boeing designers feel is tailored for the 1969 mission is a round ball (relatively easy to sterilize) about 24 inches in diameter. It would weigh about 30 pounds and would be carried aboard the orbiter until it was ejected by a tiny rocket towards the red planet.

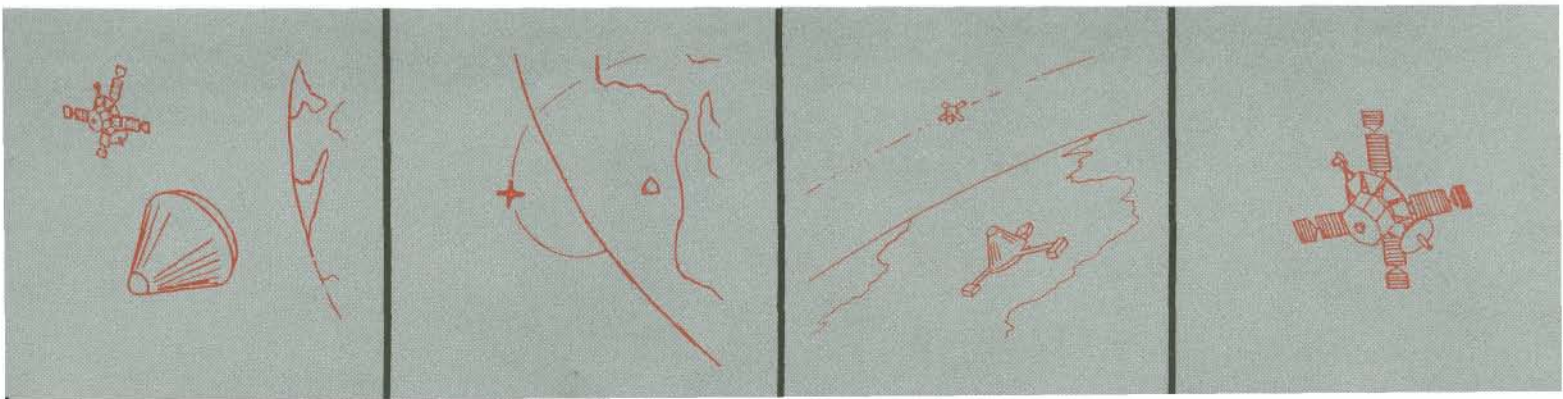
Carrying only a simple power supply (probably a silver-cadmium battery) and a receiver-transmitter for receiving and responding to signals from earth tracking stations, the ball-probe would plunge through the Martian atmosphere.

Scientists, by measuring the change in frequency or pitch of the probe's signal, would be able to determine the drag of the Martian atmosphere. The basic technique is scarcely more complicated than the method used by police radar to trap speeding motorists.

Unique Boeing studies, verified by computer simulations conducted by scientists at NASA's Ames laboratories, have shown that it wouldn't be necessary to track the probe throughout its descent—only at the beginning and the end. The communications blackout which would occur as the probe streaked through the Martian atmosphere could be discounted as a major problem.

This simple probe, Holman says, would permit scientists to measure the changing density of Mars' atmosphere, determine how much atmospheric pressure there is on the surface of Mars, and how much drag man can expect when he one day sends a soft-lander to the mysterious planet.

During the first few minutes of such a mission, man might learn more about Mars than he has learned in all the time since he first noticed the untwinkling red planet in the night sky. Ultimate goal, of course, would be to gather data to support manned missions likely to follow the mid-1980s.



Tom Layne, at left, checks out two of American's top pilots.

Airlines personnel learn 727 operation from

FLYING PROFESSORS

Pakistani crew is Boeing trained.

By ROBERT NEPRUD

HAVE YOU ever guided a jet airliner through a driving rainstorm at 35,000 feet over India? Or met a herd of giraffes strolling unconcernedly along the runway on your final approach into Nairobi? Or kept a weather-eye out for armed MIG fighters waiting to pounce if you should happen to let your jetliner stray a few feet across an invisible border in Central Europe or the Middle East?

The Boeing Company's flying professors—pilots and flight engineers of the flight crew training unit—have experienced all of these thrills and more, in line of duty.

The flight crew training unit, with headquarters in the Flight Center at the north end of Boeing Field in Seattle, is the group that trains airline personnel to operate Boeing jetliners.

The new 727s are principal objects of study at the moment.

When an airline places an order for jets, the price of the aircraft includes a number of man-days of crew training. Additional training is offered at standard rates, either during the initial airplane break-in phase or later in the program.

See-and-do training on the ground and during flight, qualifies a transitioning pilot or flight engineer to hold Federal Aviation Agency rating or the equivalent foreign certificate required to fly revenue passengers.

Transitioning airline personnel first go through a ground school familiarization course at the Airplane Division's jet training school at Renton, near Seattle. This basic session, which runs for 120 concentrated hours, can be completed in three weeks. If desired, additional ground school courses may be obtained to fit the special needs of an individual airline.

When possible, airline crews go through flight-simulator training before taking to the air. Boeing flight crew training teams have assisted a number of airlines in setting up their own pre-flight simulator training programs.

Initial transitional flight training usually takes place at Boeing Field. Follow-up training may be staged in dry and sunny Tucson, Arizona, in El Paso, Texas, or at the airline's home base.

Heading up the flight crew training unit is Tom Layne, a pilot with both military and airline experience who has been flying airplanes (and desks) for Boeing these past 17 years.

When asked what type of man it takes to qualify for a spot on his high-flying faculty, Layne said, "He has to be well qualified on multi-engine jets, he must be a good instructor and it helps if he's also a psychologist and a diplomat."

Because of the many unusual demands upon a man—the unpredictable hours, the pressures and the long periods away from home—

Layne feels that an individual must possess a well-adjusted personality and be truly dedicated to stick with the unit very long.

"It also helps if he has a patient and understanding wife," he added.

The majority of the instructor pilots and flight engineers on the Boeing staff have been around for some time. Quite a few of them, according to the personnel records, have spent more time on the road than in the Seattle area over the past few years. There are several, in fact, who have logged upwards of 200 days per year on outside assignments, much of it foreign duty.

"Some people envy us our trips abroad," commented Layne. "They don't seem to realize that life can get pretty lonesome when you're away from your family in a strange country for weeks and sometimes months at a time."

Layne says that when an airline is in the throes of introducing a new airplane such as the 727 jetliner, the pressure is always on. Millions of investment dollars, the airline's reputation, and even national prestige may be riding on the successful debut of a new jet airliner. A Boeing representative from the training unit will be on hand wherever the airline wants him and can give much practical assistance to keep everything running smoothly.

Wherever the flying professors go, Layne observed, they make many friends. The Boeing policy of having instructors continue working with their old customers helps to cement this friendly relationship. After the regular training is over, a Boeing pilot-engineer team usually visits an airline once or twice a year, both at the cockpit and at the operational supervision levels.

The flying professors also are constantly on the lookout for possible improvement areas in a new-model jet. When crewmen are flying up to 12 hours a day and up to six days a week, they sometimes get ideas which result in constructive design changes.

An obvious question is: How do the Boeing instructors cope with the language problem when working with foreign airline personnel?

As far as big international airlines are concerned, the problem often does not exist. English is the official language for airline control and many persons speak it fluently.

Reflecting both the mounting number of aircraft orders registered over the past year and the worldwide pilot shortage, the workload facing the Boeing flight crew training unit over the next 18 months is formidable. When necessary the unit will recruit reinforcements from the Boeing experimental flight test group.

Recently, Boeing flying professors were in Tucson working with pilots and flight engineers of the two leading Australian domestic airlines. Trans-Australia and Ansett-A.N.A. National Airlines crews worked with Boeing instructors last month and Northwest Airlines men are taking their turn this month, flying new 727s. Four Boeing instructor teams are contemplating Christmas in Trinidad with British West Indian Airways personnel and that airline's first 727.

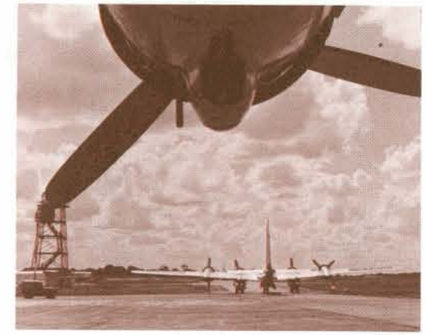
In Japan, Boeing pilots and flight engineers are training crews and flying the line with the customer—in this case All Nippon Airways, which already has set some remarkable reliability records with its leased 727.

North, south, east and west, the flying professors are doing a job for Boeing customers and are available for additional assignments.

Procedures trainer at school is "flown" by 727 crews.

Flying Professor Paul Maier presents totem pole to All Nippon Airways President Kaheita Okazaki in Tokyo.

Long-range high altitude RB-50s are going strong in 15th year of service.



New Guinea boys savor first close look at big balus.

Upper left: Reliable old Boeing photo planes work day in and day out, at points around the world.

Left: Technicians process and evaluate film as soon as possible after aerial photo mission.

Sturdy old RB-50s map the world.

BIG BALUS OVER NEW GUINEA

By CHESTER CHATFIELD

AIRPLANES hold an almost universal appeal for the younger set. Two pupils from a school high in the mountains of New Guinea proved no exception when they visited the Port Moresby headquarters of Aerial Survey Team 7, a unit of the United States Air Force 1370th Photo-Mapping Wing, which has its headquarters at Turner Air Force Base, Georgia.

For several years the wing's Boeing RB-50 aircraft have been crisscrossing this corner of the Pacific obtaining geodetic information to help produce up-to-date maps of the area.

The two students, Kopa Goma, 11, and Avui Voro, 9, watched the four-engine planes pass over their village in the Owen Stanley Mountains on their way to and from mission areas. The boys were so fascinated by the aircraft that their teacher in the Woitape school, Hugh Johnson, arranged a visit to Port Moresby so his pupils could see the RB-50s at close range.

Although this was their first encounter with so-called modern civilization and they had never seen the ocean before, the boys' first request was to go out to look at the "big balus" (big birds).

Aerial surveying in the New Guinea area is only one job of many in progress by the 1370th Photo-Mapping Wing, flying arm of the Air Photographic and Charting Service, a sub-command of the Military Air Transport Service. The wing is responsible for precision aerial photography and for aerial electronic geodetic surveys.

Accurate and modern maps are vital to national defense programs, as well as being primary requisites for the economic and cultural development of many countries. The aerial photographs of the 1370th provide Department of Defense cartographers with the raw material to produce these modern maps.

The wing acquired 16 Boeing RB-50s in 1950 and 1951 and has kept most of them in work-horse service ever since. Two of the durable planes were retired this year.

The B-50 originally was developed as a strategic bomber. A number were built and assigned to three Strategic Air Command groups in 1948. The following year a number of new B-50B bombers were built in Boeing's Seattle plant and flown to the company's Wichita plant, where they were modified to become highly efficient photo planes. After 14 years of service, they have millions of map-making miles behind them and still are going strong.

In addition to its aerial mapping, the wing also photographically supports atomic tests and missile launches. Long-distance aerial geodetic measurements completed by the 1370th are vital data used in missile and space vehicle guidance systems.

These long-distance surveys are used to connect existing geodetic networks throughout the world. As an example, prior to 1956 the geodetic measurements in the United States and those on the European continent had not been satisfactorily related.

Completion of the North Atlantic tie in that year by the 1370th established, with a high degree of precision, a linkage of connecting measurements between the two continents. As a result, the exact relationship between missile launch sites in the United States and potential target areas on the Eurasian land mass were determined.

These long-distance geodetic measurements are completed with a system called HIRAN, which operates on the principle of radar. An aircraft flies between two previously selected ground station sites, emitting electronic pulses to the stations. The pulses are relayed back to the aircraft and their round-trip time is measured. Through a series of calculations based on the speed of the pulses through air, a very accurate distance between stations can be determined.

The 1370th Wing is constantly investigating new procedures and equipment to improve reliability and accuracy of its surveys. Use of frequencies in the 3,000 to 3,500 megacycle "S" band in a new system called SHIRAN promises even greater accuracy and reliability than heretofore.

To accomplish its work, the 1370th has aerial survey teams deployed throughout the world. Composed of personnel from all seven of the wing's squadrons, these teams, such as the one in New Guinea visited by the two barefooted students, are practically self-sustaining.

Maj. Roy West, then AST 7 commander, arranged for SSgt. Louis R. Frye to conduct the two students on a tour of the unit's facilities. When the youngsters reached the flight line, their dreams had come true. At last they had been given the privilege of inspecting first-hand the big balus which sometimes fly over their village.

U. S. Army's Chinooks take dip in

HELICOPTER SWIMMING POOL

By MARVIN G. KLEMOW

A SWIMMING POOL has been built at Boeing's Vertol Division in Morton, Pennsylvania, but not one of the 9,000 employees can go in for a dip. The backyard swimming hole is strictly for helicopters.

The new facility was designed by company engineers to determine if fuselages of the helicopters built at the Vertol Division have been properly sealed in production. Water-tight fuselages make it possible for the helicopters to land and maneuver on water.

At present United States Army CH-47A Chinook helicopters are being tested in the swimming pool. Each helicopter is rolled into position on a grated platform and tied down with special hooks. The platform is then hydraulically lowered until the bottom of the helicopter is six inches below the normal static water line.

This simulates a Chinook in the water at its normal gross weight of 33,000 pounds. The lower the helicopter is pulled into the water, the higher the simulated gross weight becomes. After the helicopter has been in the water for 30 minutes, the platform is raised and inspectors check the compartments to see if any seepage has occurred.

Model 107 helicopters being built by the Vertol Division for the United States Marine Corps, the Royal Swedish Navy and Air Force and the Royal Canadian Air Force and Army, also can be tested in the pool.

To test further the water capability of the U. S. Army's Chinook, a Vertol Division team has been taking part in a series of tests at the Naval Air Training Center, Patuxent River, Maryland. The helicopter is taxied upon the water at speeds up to ten knots, both engines are shut down and restarted while floating, water landings with sink rates up to eight feet per second are performed and autorotational landings are made on the water.

Chinook helicopter is run onto a grating over pool for testing.

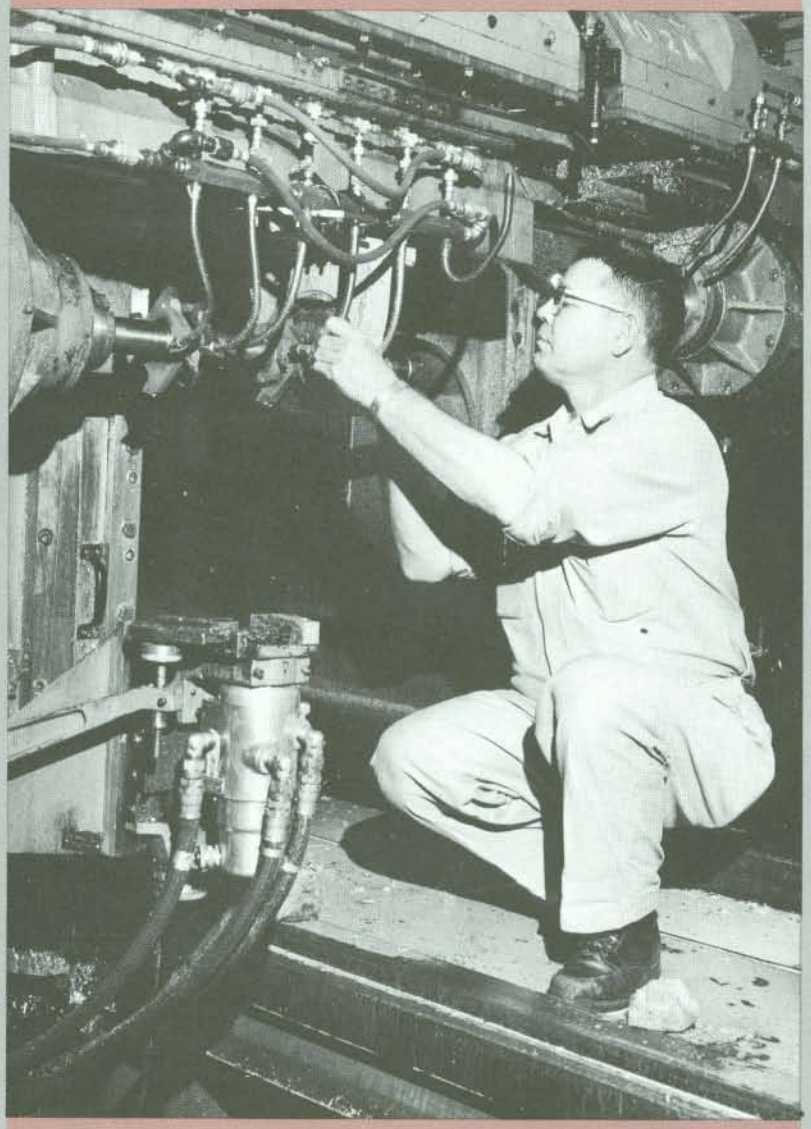
Down goes the grating into water.

Ties to grating pull helicopter six inches below its water line.

New device cuts machining costs.

HOW TO COOL A HOT SPOT

By DONALD BRANNON



Mechanic adjusts mist-spraying nozzles on milling machine.

"WE can't do a job when we're down, and I want us to be able to do a job."

"Down" to Case McCarroll means an inactive spar mill. And the job is machining slabs of aluminum used to build electrical cabinets for Minuteman ground support equipment. As a maintenance mechanic in the Aero-Space Division's Seattle facilities, McCarroll's duty is to keep the big milling machines running at top efficiency.

When milling machine cutters chew into metal they generate heat. Unless this heat is dissipated, it can shorten cutter life and change the properties of the metal being cut.

Traditionally, the hot spot where the cutter bites into the workpiece has been cooled by flooding it with a mixture of water and soluble oil. Machinists call this coolant "milk." As the white stuff runs off the workpiece, it carries peeled-off metal chips. The milk collects in receptacles, passes through filters to remove the chips, and returns to reservoirs for reuse.

Such a system works fine until the filters plug up—which is about twice a day. That causes the coolant to spill over the machinery, and milk which should be cooling the hot spot is sloshing around the ankles of the machine operator. The machines must be stopped until the filters are cleaned. Much of the milk is wasted.

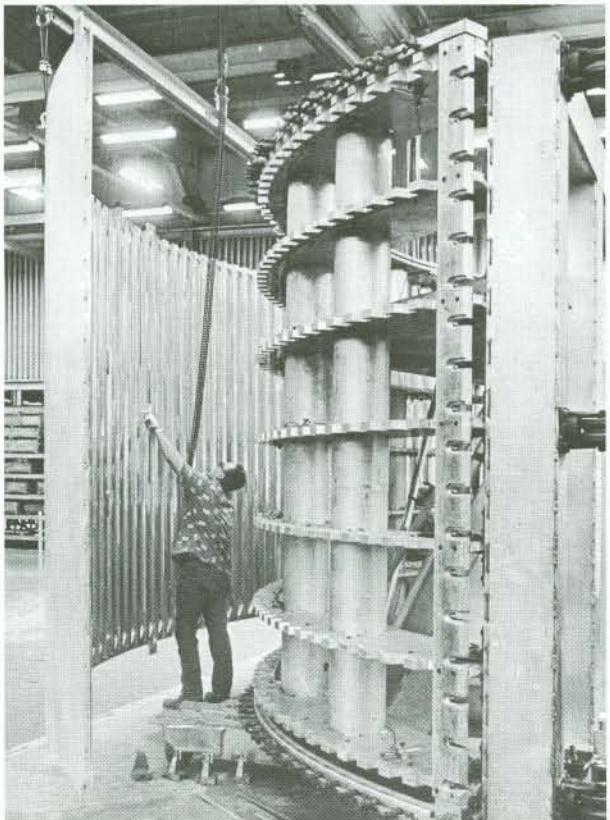
McCarroll changed the system. He removed the jets which directed the milk to the hot spot. They were replaced with spray nozzles and an air pressure system. Now the milk is sprayed on in a fine mist.

Under a pressure of 50 pounds per square inch, the spray does a better cooling job than the previous gravity-fed stream of milk. Spar mills no longer have filters to get plugged. Milk consumption has been cut in half. Cleanup and cooling-equipment maintenance have been reduced from 3,402 to 130 man-hours annually.

What happens to the milk mist? It evaporates, carrying off the heat, and enables machine operators to leave their overshoes at home.

Plasma coating is applied to fixtures by ionized gas gun.

Fuel-tank segment for Saturn 5 is removed from fixture after being curved by age forming.



Wichita men advance metal forming.

CURVES CURED TO ORDER

By DARRELL BARTEE

MAJOR refinements in the process of age-forming parts for space vehicles recently were devised by manufacturing specialists at Boeing's Wichita Branch. Techniques for forming high-strength metals have been developed, and a plasma-type protection for tooling has been introduced. New projects

of increasing complexity are under way.

Age-forming has been used effectively at the Kansas plant since early 1963, mostly for production of the massive, integrally stiffened walls for the fuel and liquid oxygen tanks of the Saturn 5 first-stage booster. It is a method of shaping and aging a metal part by first clamping it to a curved fixture, then heating it in a furnace. When cooled and released from the fixture, the part is permanently curved to the correct configuration. The method saves time and money, compared to the older concept of prerolling, heat-treating (in a restraining fixture) and then eliminating distortion.

The Wichita Branch received a new assignment recently to adapt the age-forming method for the shaping of the "polar cap" center pieces at the tops and bottoms of the booster tanks. Another new project is to develop a complete set of ground rules for age-forming 6AL-4V titanium. Both jobs are parts of Wichita's development and production work for the National Aeronautics and Space Administration's Saturn-Apollo program to put men on the moon.

Saturn 5 boosters are being assembled by Boeing's Launch Systems Branch at Michoud, Louisiana, but 90 per cent of the hardware is being fabricated at Wichita. The Kansas plant does most of its work through the Launch Systems Branch. However, some age-forming development work has been contracted directly between Wichita and NASA's Marshall Space Flight Center at Huntsville, Alabama.

In the tank-wall work on the boosters, fixtures of aluminum hold the walls in the desired shape. An electric furnace heats them at about 325 degrees F for 24 hours.

In the new work with titanium, one of the steps taken by the Wichita age-formers is a switch to steel, in place of aluminum, for the clamping fixtures. Furnace temperatures are raised to about 1,000 degrees F.

This heat eventually would have a deteriorating effect on the surface of the fixtures. During production runs, the fixtures are subject to many alternate periods of heating and cooling, which causes the surfaces to flake and peel.

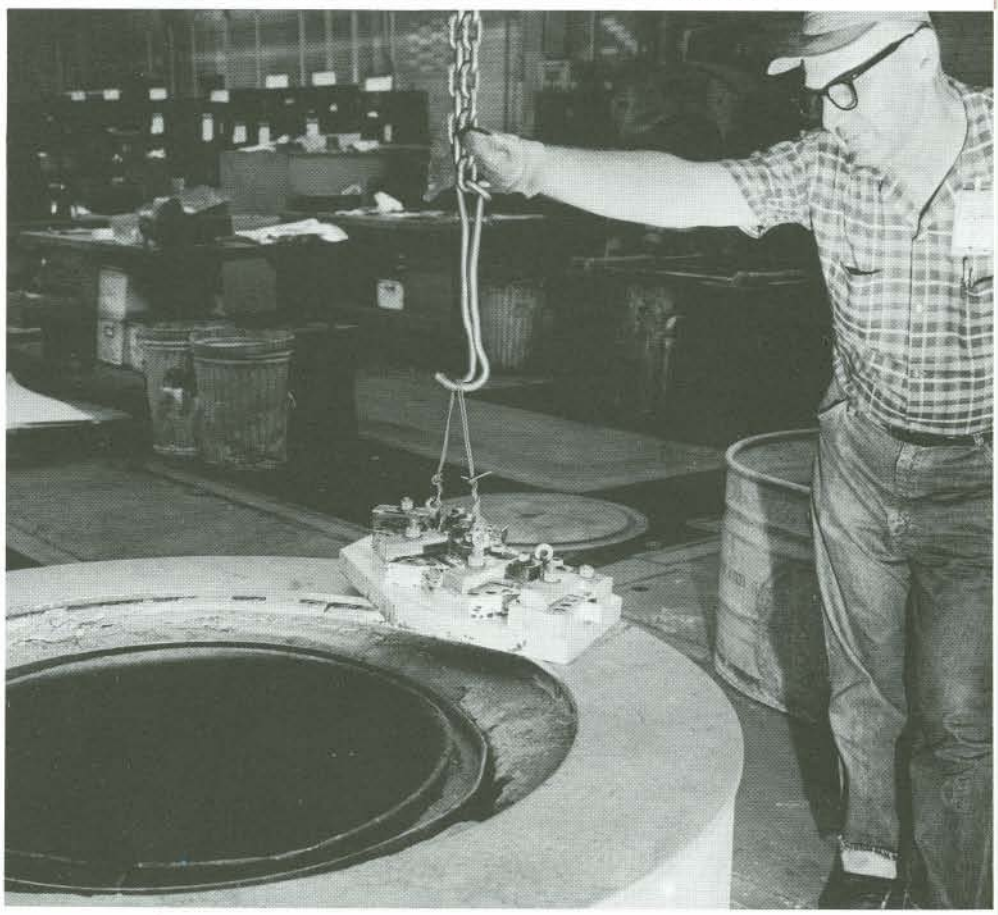
This problem was solved by the introduction of a plasma coating of aluminum oxide, as a protective covering for the fixtures. This coating process gets its name from the use of an ionized gas gun which delivers a flame at about 30,000 degrees F. It melts a refractory type powder in mid-air and applies a spray coating which cools to a porcelain-like surface. First use of the process for Saturn tooling at Wichita indicates that the plasma coating effectively protects the fixtures, so that they can be used indefinitely.

The use of age-forming to shape the circular, dish-shaped polar caps from flat sheets of aluminum alloy is quite different from forming a simple radius, because of the compound contouring involved. It is necessary to determine the effect of metal grain direction, sculpturing and thickness, as well as the nature of the compound springback. These caps are 55 inches in diameter, varying in thickness from ¼ inch to ½ inch. Four are required for each booster.

The Wichita age-formers have tested their process on metals of superior strength, including maraging steel. This is a new nickel-base alloy with a strength rated up to 300,000 psi, compared with the aluminum rating of about 65,000 psi. With some adjustments in tooling and in forming temperatures, the maraging alloy responds readily.

Indications are that when aerospace vehicles of the future demand higher-strength alloys, the age-forming method will expand to include them.

Titanium clamped in fixture emerges from 1,000-degree aging furnace.



ADVENTURES IN MANAGEMENT

HIGHER FLYER

IF THE once-popular conception of a test pilot as a man who went aloft alone into the dawn, white scarf flaring, to cast dice with fate were still held today, probably no one could do it more damage than Richards L. "Dix" Loesch, chief of flight test for the Airplane Division.

From his office in the company's Flight Center at Boeing Field, businessman Loesch quietly and competently directs a staff of more than 300 persons devoted to proving and improving Boeing aircraft.

Flight test's top job leaves little time for piloting, but he still takes the controls "when there's something I want to see myself."

Born in Chicago and reared on his parents' farm in Montrose, Colorado, Loesch attended Massachusetts Institute of Technology on a scholarship, graduating in 1939. After a year with an eastern aircraft manufacturer he joined the Navy's flight-training program and during the war saw carrier fighter duty in most of the major Pacific campaigns ranging from Guadalcanal to Attu. After discharge in 1946 he joined Boeing as an aerodynamicist.

In 1949 he transferred into flight test. "I decided to go back to what I could do best," is his explanation. This sound reasoning was promptly followed by a string of important assignments and promotions.

Loesch participated in flight testing the Stratocruiser, C-97, B-50, B-47, B-52, KC-135 and, as copilot, made the initial flights of the 707 prototype and the 727. Named chief of flight test in 1960, he later relinquished a traditional prerogative and gave over the piloting of the 727 on its first flight to Lew Wallick, the man he had named project pilot when the airplane was in its design stages.

"Dix," an associate explains, "considers flight testing a heavy responsibility. He wants our military and commercial customers to know when they buy a Boeing airplane that it has been designed and built as nearly perfect as possible and flight tested to specifications."

In a world with its face now turned toward space and in which flying has become commonplace, it still is well to remember that millions of travelers fly faster, farther and safer thanks to Loesch and his crew.

TEAM WORKER

WASHINGTON State was not his first choice as a place to live and Boeing was not his first choice as a place to work, but as a Boeing executive observed, "Preston Smith goes where the fast water is."

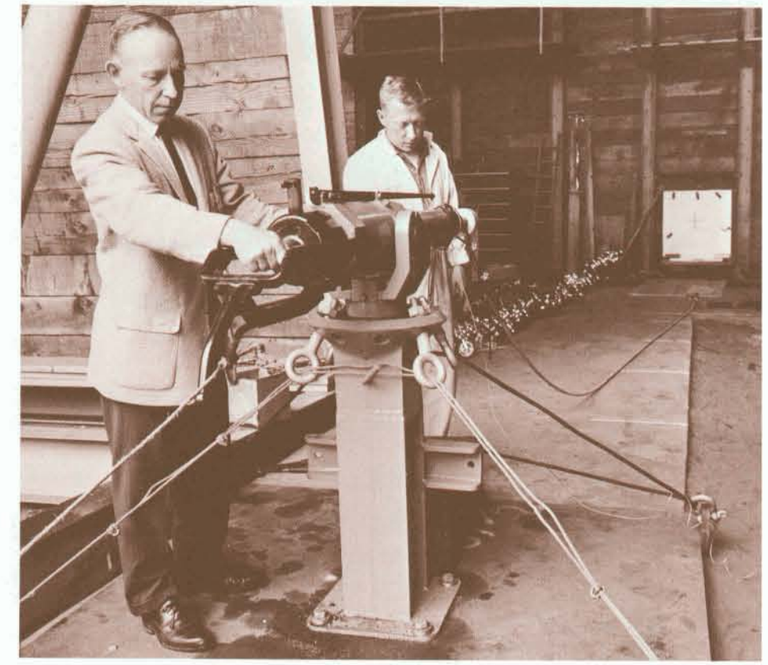
Smith, now Aero-Space Division's assistant director of finance, joined Boeing in 1948 after having been graduated from Oregon State College with honors in industrial management. Two years later he waded into the whirlpool that was the B-47 program build-up at Wichita. He emerged from there convinced that complex problems are not solved by individuals but by positive team action.

Thorough knowledge of any project is a must with Smith for doing anything well. Concerned over knowing all the facts, he starts earlier and works later than his counterparts in order to "stay on top." This approach has limited some former outside interests, but he still enjoys occasional camping trips with his family.

Smith's career was punctuated with a variety of assignments in the manufacturing operations of four divisions until 1961 when he was selected to attend Stanford University under the year-long Sloan Fellowship program. There his classmates recognized his leadership abilities and elected him chairman. His instructors detected his financial acumen and nurtured this interest. The result: a blend which led to his being appointed Minuteman finance manager a few months after his return from Stanford.

During his Minuteman assignment and, more recently, in his work reducing division overhead costs Smith has avoided being labeled a "budget bear." His objectivity in developing solutions to complex cost and accounting problems and his negotiating skills have won the respect of fellow managers and impressed customer representatives.

Today Texas-born Smith is happy with his adopted Washington State and Boeing has been his firm choice as a place to work since his first few weeks on the job. "I used to sneak aboard those Stratocruisers during lunch hour to admire the interior from cockpit to tail," Smith smiles. "I had never seen anything like it, and it was a great feeling to be part of a team that could create something that fine."



Norwegian 50-mm. harpoon gun is readied for test.

Whale killer aids Army research.

HARPOONED FOR HIBEX

THE HALIBUT SCHOONER *Harmony* of the United States Fish and Wildlife Service has a harpoon gun on its deck which recently made a contribution to America's defense. Primary purpose of the gun is to kill killer whales, but it also served in a research project for the United States Army.

In January, 1964, Boeing received a $15½ million contract with the Army Missile Command to develop a high acceleration experimental booster rocket (HiBEX) for the Advanced Research Projects Agency of the Department of Defense.

Engineers plan to attach an electrical cable to the rocket during early test firings, for data reporting during the first moments of flight. They needed to know what kind of cable would work, how it must be attached and how it would react under extreme acceleration. So they borrowed the harpoon gun.

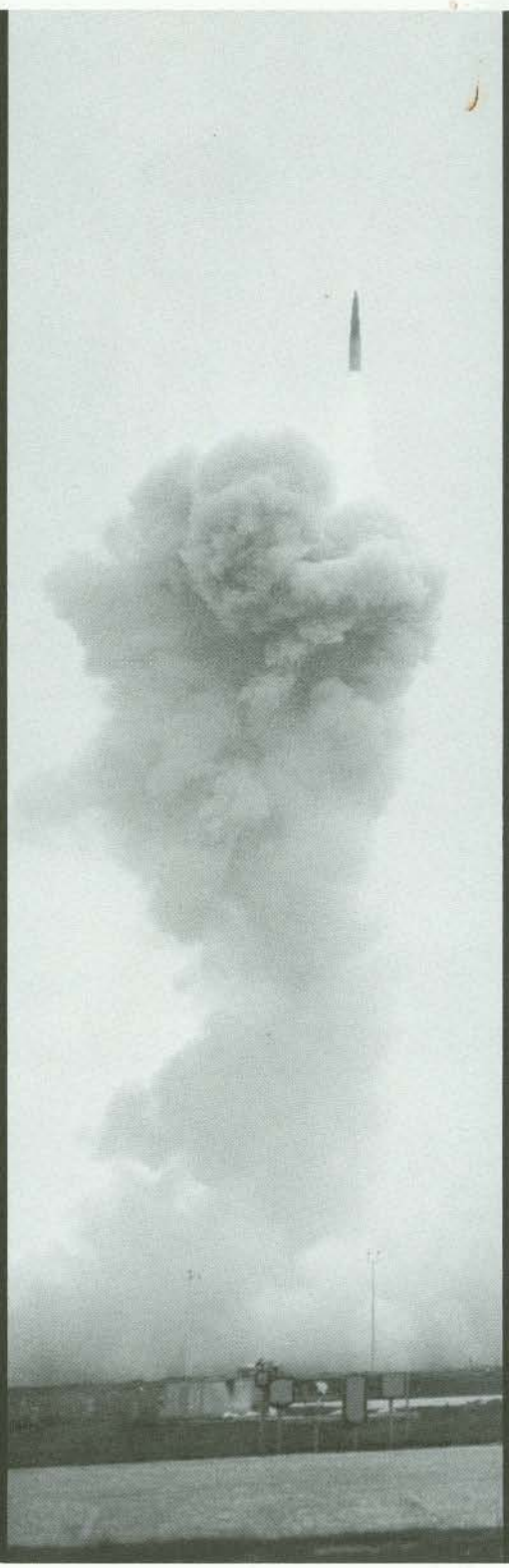
Boeing machinists fashioned a blunt-nosed harpoon-like projectile to which cables for testing could be attached. An old, massively reinforced building on Boeing Field in Seattle provided an ideal test site. It had been built for test firing machine guns mounted on Boeing bombers.

Four shots were fired during the cable-test series. High-speed movies and instruments recorded results.

Boeing's Aero-Space Division had the harpoon gun for three weeks and then returned it to the Fish and Wildlife Service in time for a killer-whale hunt in Alaskan waters. By now the whales wish that Boeing had kept the gun.

"It's minus 40 and we have a hold . . . I'm sure it's o.k. Everything has gone fine and on schedule . . . Minus 21,20, 19—keep your fingers crossed. Getting close, 8, 7, 6, 5, 4, another hold . . . There it goes! Straight up! Almost went through the smoke ring! Beautiful! Wait, I lost it in the clouds . . . I see it again! Looks good. Second stage ignition . . . Can't see it any more, but it's a good one."

This is an eyewitness report of the first firing of a Minuteman II missile from Cape Kennedy, Florida. Minuteman II is an advanced version of the Minuteman ICBM, with heavier payload, greater accuracy and increased range.



The first test flight of the advanced Minuteman II was perfect—from launch at Cape Kennedy to a direct hit in the splash net near Ascension Island. Boeing is weapon system integrator on Minuteman, responsible for assembly, test and ground support systems.

BOEING