

MARCH-APRIL 1971



# ***Aerospace International***

HELICOPTERS:  
AN  
EDITORIAL ROUNDUP



# The World of the Helicopter - Versatility Unlimited

*The helicopter's unique ability for vertical flight has given man the freedom of a third dimension. Whether this characteristic finds application as an airborne weapon system or as a means of transportation, the helicopter has proved readily adaptable to tasks undreamed of 20 years ago. This article outlines the manifold extensions of a wondrous flying machine that has come into its own . . .*

BY JEAN ROSS HOWARD

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*A member of the Aviation/Space Writers Association, an Honorary Fellow of the American Helicopter Society, author of the book "All About Helicopters," Miss Howard is a helicopter pilot, founder and International President of the Whirly-Girls (international women helicopter pilots). In the Aerospace Industries Association Public Affairs Office, she specializes in VTOL aircraft and in hospital and public-use heliports.*

with the technological know-how, Yankee ingenuity, and transportation needs of the new.

The helicopter's ability to land and take off vertically from almost any small surface, and hover and fly



Today's U.S. helicopter is typically American: its ancestors came from Europe—from Italy, England, France, Russia, and Germany. The result is the best of those two worlds—the early designs and inventiveness of the old world matched

in any direction, has given man a completely new freedom of flight.

As for the history of the war in Vietnam, it will be written as the "helicopter war." Transporting troops and their heavy equipment, delivering supplies to remote locations, providing armed escort and close air support, rescuing downed airmen and others, retrieving downed aircraft, evacuating casualties, serving as observation platforms, providing commanders with airborne command posts, and in a dozen other ways the

in combat, and no one really knew the capabilities of the helicopter under fire. With bullet holes in the fuselage and rotor blades, these underpowered, overloaded rotorcraft kept flying. More than 23,000 United Nations personnel were rescued by helicopter—many in outside litter pods of what was a flying ambulance.

After Korea, the true potential of the helicopter was recognized—for civilian as well as military requirements. There was greater progress in helicopter production. And helicopters with increased capacity, longer range, higher speeds, and lower operating costs became available.

The U.S. Army's recognition of helicopter potential resulted in the

important roles. In addition, equipment and supplies were redesigned to be readily air transportable.

### Traffic Emergencies

In the U.S. today, there are more than 50,000 highway fatalities annually, and 2,000,000 more people are injured, including 185,000 disabled. It became evident some time ago that a soldier wounded in battle had a better chance for survival than many highway accident victims because of rapid evacuation by helicopters.

U.S. government, medical, and safety organizations took a hard look at this fact. The helicopter manufacturers and operators teamed up to design a helicopter that could be quickly changed from its utility role to that of an aerial ambulance. By 1967, Fairchild Hiller Corporation had produced the first U.S. civilian helicopter ambulance. It had double doors to facilitate loading patients, and folding litters that could be stored in the baggage compartment when not in use. Today, Bell Helicopter Company, Boeing Company's Vertol Division, Fairchild Hiller Corporation, Hughes Tool Company's Aircraft Division, and LTV's Vought Helicopter, Incorporated, produce or market helicopters that can be equipped to transport internally two litter patients, a medical attendant, and pilot.

In further recognition of the mounting traffic toll, U.S. government funds were made available to states for test programs to improve emergency medical services on highways. In addition, several communities crossed county lines and budgets to operate civic ambulance services. The U.S. Departments of Defense, Transportation, and Health, Education, and Welfare currently are conducting a test program—Project MAST—utilizing military ambulance helicopters and personnel to assist civil agencies in providing faster medical attention to citizens, primarily in rural areas where both speed and transfer to larger medical facilities are required to save lives. During the first three months of MAST, 61 lives were saved (*see September-October issue, page 45*).

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*A Fairchild Hiller FH-1100 ambulance helicopter lands on a highway near an accident.*

helicopter has proved itself. And for rescue, the helicopter is supreme. No other vehicle has achieved such a record in saving lives.

The military pilots in Korea pioneered rescue work. Many had never flown at night, none had ever flown

1963-65 Air Mobility study, and tests which led to the airmobile concept. (*For an article on U.S. military helicopters, see page 22*) This concept gave impetus to the production of helicopters and the discovery of an ever-increasing number of im-

## Natural Disasters

Recently, helicopters responded to two natural-disaster emergencies in the U.S.

Two hours after a tornado struck the state of Mississippi, the state's three helicopters were in operation, first transporting doctors, nurses, and supplies to disaster areas, and then evacuating more than 200 storm victims.

Within seconds after 6:01 a.m., February 9, in Los Angeles, California, the worst earthquake in that area in 38 years had taken a cruel toll. Sixty-four persons were dead, more than 1,000 injured, almost 200 homes and other buildings destroyed, and at least 3,000 damaged.

It so happens that in Los Angeles is the heaviest concentration of government and commercial helicopters in the U.S. They swung into action. Missions were as varied as the type of damage. Victims had to be evacuated and doctors, nurses, supplies, and rescue equipment flown in. One police helicopter provided closed-circuit television coverage to the command post, coordinating traffic and protecting against looters. Traffic copters gave warnings and directions to listeners on the ground. Everything that a helicopter can carry—litter kits, first-aid and extraction equipment, cameras, cargo hooks, loudspeakers, searchlights, emergency radios—had a vital hand. And helicopters will be utilized in the cleanup and reconstruction work for many months to come.

## Heavy-lift Choppers

The heavy-lift helicopter is another military "spin-off" that will benefit civilians.

In Vietnam, such helicopters have recovered more than 10,000 downed aircraft with a value estimated in excess of \$2,700,000,000.

U.S. engineers for years have been looking for a way to break up mammoth highway traffic jams. One answer is the helicopter tow truck to remove wrecked cars. The helicopter can even pull two locked cars apart.

Another use for smaller civilian helicopters—like the Bell 205A and the Vought/Aérospatiale Alouette II—is to install air-conditioning and heating units on roofs in just minutes—saving both manpower and money.

Such larger helicopters as the S-58s and S-61s of United Aircraft Corporation's Sikorsky Aircraft Division have installed television

towers, telephone poles, and statues on church steeples, and have transported diamond drills and generators.

The Sikorsky Skycrane, proved in Southeast Asia, has even transported a complete mobile operating room that can be used *in flight*.

Also, the big chopper has transferred huge cargo containers from offshore ships to inland destinations, possibly the answer for emerging countries that lack seaport facilities.

The Skycrane, initially developed with more than \$10,000,000 of Sikorsky/Pratt & Whitney funds, recently lifted a complete house to demonstrate aerial delivery of assembly-line dwellings from factory to home-site, a far-reaching potential for



*A General Dynamics' Canadair Division CL-84 tilt-wing V/STOL.*

applying modern production techniques to meet the world's critical demand for low-cost housing.

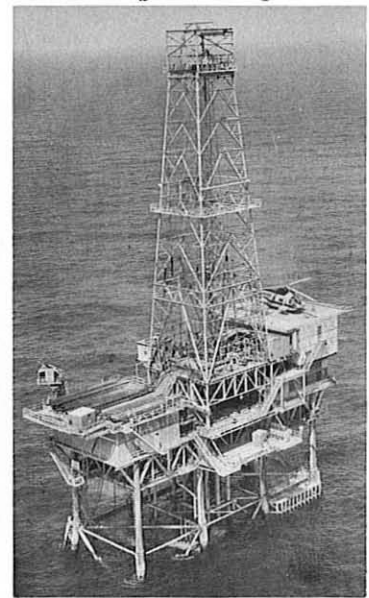
Currently, the Skycrane helicopter is being used to build a complete electrical tower line in New Jersey, including the foundation. The line crosses a nature preserve that is largely a tidal swamp. The Skycrane first carried into the sites the materials and equipment to excavate the foundations, drive the pilings, and construct the forms. The soil is

to be removed and concrete carried in and poured. The project will include building the steel towers and emplacing the aluminum bridge sections on top.

Two years ago, several Sikorsky operators made known their requirement for a turbinized aircraft of the S-58 size and lifting capability. Today, ahead of schedule, operators are offered either a complete S-58T powered with two Pratt & Whitney PT6T-3 engines mounted as a single unit, or a conversion kit that allows the operator to change from piston to turbine power. The S-58T has a 5,000-pound (2,268 kg) payload capability.

Sikorsky's S-67 Blackhawk helicopter gunship set two world speed records in December 1970. The gunship set a three-kilometer course record of 216.72 mph (almost 348 km/hr). The Blackhawk also flew a 15- to 25-kilometer course at 220.8 mph (almost 356 km/hr)—not only a

*Petroleum Helicopters services an offshore oil rig.*



record for the course, but top official speed for a helicopter.

Built with company funds, the Blackhawk is designed as a low-cost, low-risk weapon system.

Oil workers in Louisiana, Norway, Holland, Borneo, Malaysia, Australia, Canada, and the North Sea now go to and from their daily jobs on oil rigs by helicopter. In the Gulf of Mexico, for example, workers can quickly reach rigs many miles out. By boat, the trip used to take eight

and New Orleans for the establishment of hospital heliports. In 1965, based on an Aerospace Industries Association survey, there were 34 hospital heliports in the U.S. Today there are 285, and more are proposed.

to ten hours. Workers also know that, in case of accident, helicopters will get them quickly to one of many nearby hospital heliports.

### Two U.S. Record-holders

Two companies whose names are synonymous with helicopters were organized in the late 1940s: Canada's Okanagan Helicopters Ltd. and, in Louisiana, Petroleum Helicopters Incorporated.

Okanagan Helicopters holds a record. For the first time in Canada, and possibly the world, all materials, equipment, and supplies to build a dam have been flown in by helicopter. This was the Kitimat Dam Project in the inaccessible terrain of northern British Columbia.

### Turbine Engine

The introduction of the turbine engine has proved the greatest single breakthrough in the development of the helicopter. The turbine's reliability, simplicity, and low maintenance cost result in operating economy and improved passenger acceptance. New techniques and materials have made possible a whole new generation of helicopters with reduced drag, increased speeds, lower sound levels, and lower seat-mile costs.

### Crime-fighting Copters

Company-funded helicopters have been developed with high-intensity searchlight, siren, public address

Aircraft Division successfully pioneered the concept of an around-the-clock patrol by helicopter, other cities adopted this modern method of combating crime. With the eye in the sky, lawbreakers can be spotted and held by the high-powered searchlight until squad cars arrive, and the high-speed getaway car isn't much help when a helicopter is overhead. Lawmen have labeled the crime copter the most effective support equipment since the 1929 advent of radio-equipped patrol cars.

*Aérospatiale Gazelle is to be built by Vought.*



*Kaman HH-43 Huskie rescue chopper.*



*Helicopters are being used for speedy bank pickups.*



*Sikorsky's S-67 Blackhawk gunship.*

A record of 1,000,000 flying hours—by helicopter and by one firm—is beyond comprehension. Petroleum Helicopters, the world's largest helicopter operator, holds such a mark. From a modest beginning of three three-place Bell helicopters in 1949, today there are 183 Petroleum helicopters operating in the U.S. and South America. To provide emergency medical care for offshore oil workers, Petroleum pioneered work in the Louisiana coastal area

system, and closed-circuit television for law-enforcement agencies.

Crime is being fought by helicopter in Lakewood, California, as it is in more than 50 other U.S. cities.

Although the New York City Police Department's Aviation Bureau pioneered municipal use of helicopters some 20 years ago, only a handful of other cities operated rotary-wing aircraft until recent years. But, after the Lakewood Sheriff's Department and Hughes Tool Company's

### Corporation/Executive Use

In 1968, more than 50 percent of commercial jet helicopters were sold to U.S. corporations. The majority of corporate helicopters today are equipped with folding litters so that they can serve as "good neighbors" in the community in times of emergency. To meet the requirements of the expanding corporate market, Bell has now produced the first rotary-wing  
*(Continued on following page)*

aircraft developed from start to finish for executive use. The new Twin Two-Twelve is a twin-turbine executive transport that seats six, eight, or 10, or a general-purpose, 14-plus-pilot configuration. A military version—the UH-1N Twin Huey—is being delivered to the U.S. Air Force.

President Eisenhower was the first Chief Executive to have a helicopter, and his regular use of it helped focus world attention on the ease and reliability with which rotary-wing aircraft reduce travel time.

Banking by helicopter means quick, sure delivery. For example, the Atlanta Citizens and Southern National Bank in Georgia uses helicopters to pick up checks from its 30 branch banks and affiliates within a 50-mile (80 km) radius. The helicopters make two scheduled flights per day, 2,000 hours per year. They land on lawns, in shopping-center parking lots, and on rooftop heliports to deliver interoffice mail and supplies. Where landing areas are not available, a unique pole pickup is used—reminiscent of the train mail pickup of the past.

travelers have the benefit of a complete air-transport system.

It is apparent, too, that planning for short-haul transportation service deserves top priority in providing a complete air-transport system.

Surveys show that, in the U.S., 30 percent of air passengers travel less than 300 miles (483 km); in the New York area, 50 percent travel less than 300 miles; while in Europe, almost 85 percent of air passengers travel less than 300 miles per trip.

In June 1970, Sikorsky and Pan American World Airways successfully demonstrated city-center to city-center helicopter service between Boston, New York, Philadelphia, and Washington, D.C. (*see July-August 1970 issue, page 53*). Earlier, a similarly successful demonstration was conducted between Paris and London.

Sikorsky and Pan Am then proposed a demonstration Metroflight service, featuring scheduled helicopter service to link five cities from Boston to Washington, D.C., to be conducted by the U.S. Department of Transportation (DOT) for one year.

The demonstration would prove that Metroflight is environmentally acceptable, can significantly reduce present city-center to city-center travel time, is desirable from the public's viewpoint, can reduce the

Westland Helicopters Ltd. in England recently marked the 25th anniversary of their association.

In Japan, Bell, Boeing-Vertol and Hughes helicopters are built under license by Kawasaki Aircraft Co. Ltd., and Mitsubishi Heavy Industries Ltd. is licensed by Sikorsky.

Germany's Dornier AG, under a coproduction program, has manufactured 250 Bell helicopters for the German Army, Air Force, and Border Patrol.

In February, Bell and the government of Australia announced a coproduction program to provide 191 military and civil light-turbine helicopters during the next eight years. The first Australian-produced helicopters will come off the assembly



Police helicopters are in use in 50 U.S. cities.



Sikorsky S-64E Skycrane.

### Short-haul Shuttles

Today, air travelers in several major cities around the globe (Moscow, Paris, London, Sydney, Tokyo, San Francisco, Minneapolis, and New York) can board a scheduled helicopter airline or air taxi at a public-use city-center heliport for flights to airports with connecting jet flights, or up to 150 miles away to other city-center heliports. These

growing pressures on existing jetport passenger-processing facilities, and would be economically feasible. As yet, no decision has been made on the proposal by DOT.

### International Licensing

Over the years, U.S. helicopter manufacturers have had mutually beneficial licensee agreements with foreign manufacturers (*see story on page 14*). For example, Sikorsky and

line in April or May 1972. The fact is the first for Bell, in which both military and commercial helicopters are involved. A Bell/Republic of China project involving helicopters for the Chinese Army also is under way.

In reverse, several U.S. manufacturers are licensed to market and ultimately manufacture helicopters designed abroad.

For example, LTV Aerospace Cor-  
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poration, as part of its diversification program, has expanded into the commercial helicopter industry. Rather than acquire an existing helicopter firm or build its own production firm, LTV elected to acquire established technology. In 1969, LTV entered into agreement with France's Aérospatiale (then Sud Aviation).

The pact calls for LTV's wholly owned subsidiary, Vought Helicopter Incorporated, to market, support, and produce Aérospatiale products in the U.S. and Canada.

Initially, Vought marketed the Alouette II (*see Jane's Supplement, page 33*) and the larger Alouette III. The 18-passenger SA-330 Puma will be added to the Vought line this year. The advanced, five-place SA-341 Gazelle will be manufactured at Vought's plant in Dallas-Fort Worth, Texas.

### A Future View

What's ahead for helicopters? Well, industry is gearing up to meet future needs.

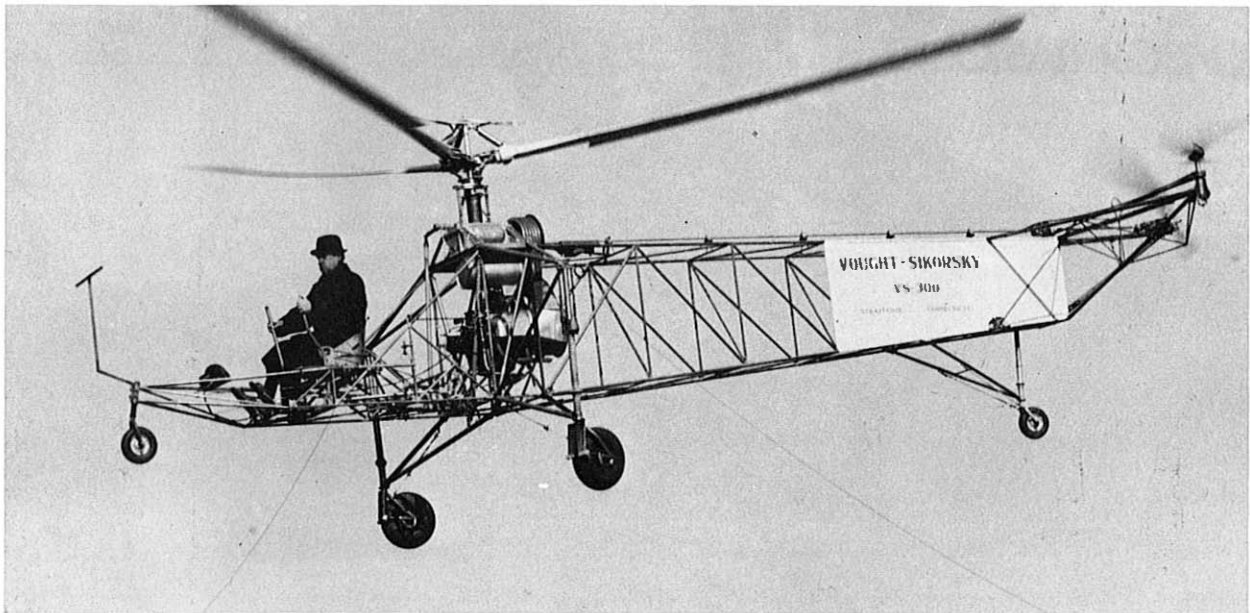
than that of the Huey now in service. The other program is development of the 25-foot Proprotor. In wind-tunnel tests, the Proprotor reached a simulated speed of over 400 knots. The Proprotor can ultimately be used on a tilt-rotor aircraft and, subsequently, on tilt-fold-rotor versions.

At Boeing-Vertol, the Model 347 flight research vehicle is being tested. The 347 is faster, quieter, and larger than its look-alike, the U.S. Army Chinook. The Model 347 is the result of a \$13,000,000 Boeing-funded program under contract with the U.S. Army, which provided the test CH-47. The Army is to receive unlimited data rights to the research findings.

The Hughes fanjet propulsion system for a heavy-lift compound helicopter is a follow-on to the "hot-cycle" propulsion system contracted for the U.S. Army. Now known as the

Around the world, they are operating in 104 countries, and range from the DEW Line in Canada to Borneo, flying in temperatures from minus 50-degrees to 120-degrees Fahrenheit.

A handful of pioneers used helicopters for agriculture as early as 1947. From this modest beginning, a worldwide industry has emerged, which certainly will continue to grow by leaps and bounds.



An historic moment: Igor I. Sikorsky at the controls of the VS-300, September 14, 1939.

General Dynamics' Canadair Division, for instance, has built three CL-84s—tilt-wing V/STOL aircraft—for the Canadian government, which are now undergoing contractor tests. (The U.S. armed services have flown evaluation tests of the prototype.)

For its part, two of Bell Helicopter's company-funded development programs will further the utility of vertical-lift aircraft. One—the Huey Plus—is to provide more lift, increased speed, and greater range

"warm cycle," a heavy-lift transport is under development.

In addition to the modified S-65 to operate proposed Metroflights in the U.S.'s Northeast Corridor, Sikorsky is developing the advancing blade concept (ABC), which calls for one rotor to be mounted above another on a common axis and rotate in opposite directions. ABC holds promise of doubling rotor cruise efficiency.

Helicopters are big business.

Now and tomorrow, the helicopter and other VTOLs will be instrumental in developing new techniques for the construction industry, for emergency medical services, for fire fighting, and for battling crime. The establishment of city-center heliports will serve as the "missing link" in the air transport system—the short-haul carrier.

The helicopter industry of the future will continue to market versatility unlimited. ☆☆☆



**AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA, INC.**

1725 DE SALES STREET, N.W., WASHINGTON, D. C., 20036 TEL. 347-2315