

## MILITARY SCIENCE

# Army Looks Skyward Again

To win brush-fire scraps, the U.S. Army is again taking to the air so that men and guns can be transported to remote battlegrounds before the enemy vanishes.

By WALTER WINGO

► EVER SINCE 1947 when the Air Corps was severed from the U.S. Army and formed into an independent service, the Army has been lifting itself back into the air.

By the end of this decade, aircraft, especially helicopters and short take-off airplanes, will be as much a part of the Army makeup as the horses of Civil War days.

"Greater air mobility" is the phrase used by Army strategists to describe the trend away from wheels.

Future wars are not expected to be fought on well defined battlefields as were the two World Wars. Head-on clashes by masses of men in tests of sheer power are now replaced by a nimble, ghostly warfare such as that waged in the woods and paddies of Viet Nam. This here-and-there fighting, arising mostly from a general dread of wide-open and perhaps atomic conflict, requires rapid movements of men to remote, often incredible battlegrounds.

In Viet Nam the enemy strikes from nowhere and quickly returns to nowhere. Only the most agile of armies can catch him.

American and South Vietnamese troops have depended mostly on helicopters for this agility.

Although at times highly effective, helicopters have not been good enough. Not only are present helicopters expensive to build and hard to maintain, but they also make easy targets for ground fire.

They are slow, noisy and carry little armor. Additional armor merely slows them more.

Better air mobility is a top project of the Army's research and development branch. Army politicians, meanwhile, fight a battle to convince the rest of the Department of Defense that the new Army air wing is directly linked with the fighting soldier and does not infringe upon the Air Force's domain.

## Adaptability Sought

The question of how much Army is to be airborne depends upon economic as well as tactical considerations. As a direct reflection of the Department's cost-effectiveness program, more future military aircraft will likely be adaptable for many various missions by simply hanging on the required combination of equipment.

The Army is especially interested in a fast utility vehicle that could loiter just behind the front lines, pop up 50 feet or so into the air, fire at targets of opportunity, and pop back down behind covering terrain. It would also be used to transport a squad of men with exceptional speed.

An aerial jeep, now being designed for the Army, will be instantly convertible for personnel evacuation, local-support weapons and artillery target-spotting as well as for general utility missions.

Giant planes with heavy airlift capacity are also needed to give field commanders flexibility in shifting combat teams as well as to surmount barriers such as rivers or mountains.

The Army more than any other service has pushed for advances in V/STOL (vertical and short take-off and landing) aircraft.

New turbine helicopters, such as the recently standardized UH-1 (the "Huey") and the CH-47 Chinook soon will be followed by aircraft incorporating some of the best features of both conventional planes and helicopters.

Leaving the high-and-fast air vehicles to the Air Force, the Army is concentrating on the low-and-slow ones which are able to land and take off in small fields or clearings.

## New Concept Studied

Three wholly different concepts are being studied to find a way of replacing the old fixed-wing two-seat Mohawk observation aircraft with a V/STOL type in the 1970s.

Soon to be tested in giant wind tunnels in

Langley, Va., is the XV-4A V/STOL Hummingbird. It lifts itself vertically by mixing high-velocity exhaust gasses with free air, resulting in greater thrust. It can hover motionless at 10 feet or travel at 450 miles per hour at 10,000 feet.

Another experimental V/STOL, the XV-5A, made its first full flight in early November, taking off vertically and converting to conventional flight.

A feature of the XV-5A's propulsion system is a set of five-foot-diameter lift fans mounted horizontally within the wings. For vertical flight, turbojet exhaust is directed to tip turbines to drive the counter-rotating fans.

The fans create columns of relatively cool, low-speed air for lift. A smaller fan in the nose of the plane provides trim and pitch control. In conventional flight, the power of the jet engines is diverted from the fans to straight thrust.

The XV-5A is designed to provide close support of ground forces, virtually living with the troops in forward areas and moving up as they do. It can also be used for observation. Its ability to fly at up to 550 mph and at tree-top level is expected to make it a difficult target for ground fire.

The Army, the Navy and the Air Force jointly are producing a V/STOL tactical transport, the XC-142. Capable of carrying 32 combat-equipped troops or 8,000 pounds of cargo, it lifts itself by tilting its wings and four engines skyward while the fuselage remains horizontal. When it reaches the desired altitude, the wing and engines



Boeing Company

**CHARGE!**—To the thundering rotorbeats of an armada of helicopters, infantry troops of the 11th Air Assault Division attack "enemy" positions in maneuvers testing the U.S. Army's new air mobility. The 22 CH-47A Chinook helicopters above can carry over 308,000 pounds of cargo or almost 1,000 troops in a single mission.

tilt forward and the craft flies like an ordinary plane.

The Army is also trying to develop a helicopter "weapons platform" with shoot-and-scoot characteristics to replace current armed helicopters.

In the past, machine guns, rockets, the SS-11 anti-tank missile and the 40-mm grenade launcher have been "rigged" for use on helicopters with varying degrees of effectiveness.

### Recoil Reduced

The weapons platform being developed by Lockheed Aircraft Corporation would use the gyroscopic action of rigid rotors to absorb recoil and to keep the platform in position while it rains rocketry and gunfire on the enemy.

The Army expects to develop this aircraft and its weapons as a single, perfectly mated system, using not only new aircraft concepts but also advances in on-board armament and fire-control systems.

Still being experimented with for short-distance mobility are rocket backpacks for the individual soldier that allow him to leap over streams and other obstacles.

Anticipating these new craft, the Army is revamping its fighting units. Being tested now is the 11th Air Assault Division and the 10th Air Transport Brigade. An air assault division would replace about 2,500 wheeled vehicles of the standard division with 358 aircraft.

Field tests completed last Nov. 13 in Ft. Jackson, S.C., showed that the average air mobile unit could carry out twice as many missions as conventional units in the same time period, while exposing itself to enemy ground fire only one-sixth as long.

The air transport brigade being tested is a mixture of fixed wing craft and helicopters for hauling supplies, especially to air assault divisions. Since it costs twice as much to haul by helicopter, the brigade would have as many fixed-wing companies as the terrain in which it is to be used would permit.

Perhaps the biggest drawback to a ground force built around aircraft is its dependence on the weather. The Army, however, intends to make the air assault divisions "self-contained" so they can fight the old style of warfare, too—at least until the weather clears.

Fair weather or foul, the Army is determined to keep the sky as a vital part of its field of operations.

It will not be long before it is only a small part of the Army that will still go rolling along.

• Science News Letter, 87:26 January 9, 1965

### TECHNOLOGY

## 'Copters in the Future To Change Our Lives

► THE RAPID GROWTH and use of helicopters in the future will affect almost every aspect of life, from hair styles to the very air itself.

This was the prediction of Dr. Melville C. Branch, lecturer in engineering at the University of California at Los Angeles and a member of the Los Angeles City Planning Commission.

"Although commercial and private helicopter production and travel are still in their infancy," he said, "the airborne baby is growing at a faster clip than did the automobile in its early days."

For instance, Los Angeles' only scheduled helicopter line, the world's first, carried 200 passengers in 1954.

In 1961, the load rose to 42,000, approximately doubled to 82,000 in 1962, and again to 171,000 in 1963.

What will be the impact of widespread helicopter use and how can we prepare for it? Dr. Branch speculates:

1. The city will gradually assume a new shape and skyline. Office, apartment, industrial and educational buildings will be large but limited in height to reduce traffic obstruction. Interspersed will be open areas for landing and parking, and clusters of low buildings suitable for roof-top landings.

2. Residential subdivisions may share a common landing field, and some streets could be reserved for pedestrian use.

3. Air space may have to be rationed, with the ticklish possibility that only a certain number of families on each block can be allowed to own a helicopter.

4. Urban background noise, already at a danger point, may become intolerable unless the noise level of helicopter engines and rotors can be greatly reduced.

5. Whirling rotor blades and windy take-offs may change fashions, spelling the end of elaborate hairdos and producing a further boom in ladies' slacks.

• Science News Letter, 87:27 January 9, 1965

## Nature Note

### Snow Crystals

► NOW, at a time of year when plants and trees stand bare and sere in dark winter fields, a different kind of flower fills the sky and gently covers the earth—the flowers of snow, those delicate many-petaled crystals of ice.

The lacy growths of water vapor are formed high in the cold atmosphere around minute particles of dust, clay minerals or meteor dust. Then they gently fall thousands of feet through the air to cover the earth with white silence and beauty.

With innumerable variations of intricate patterns and shapes, no two snow crystals have yet been found alike throughout the world.

Depending upon the supply of water molecules in the air and the temperatures, the shapes of these crystals range from austere simple bars to solid triangles, symmetrical hexagons and exquisitely delicate dendrites.

Scientists have distinguished these bits of frozen precipitation into ten basic groups—the six-sided plates, the six-pointed stellars, the elongated four-sided columns, the delicate spatial dendrites, the capped columns with a crown of crystal at each end, the irregular crystals, the graupel or snow pellets that look like miniature snowballs, the fine icy particles of sleet and the ice lumps of hail that range from one-fifth to two or more inches in diameter.

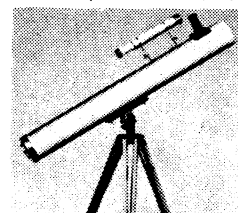
• Science News Letter, 87:27 January 9, 1965

## SCIENCE BARGAINS

Order by Stock No.—Send Check or M.O. Shipment same day received—Satisfaction or money back.

See the Stars, Moon, Planets Close Up!  
3' Astronomical Reflecting Telescope

(Famous Mt. Palomar Type)



60 to 180 Power  
An Unusual BUY!

Assembled—Ready to use! You'll see the Rings of Saturn, the fascinating planet Mars, huge craters on the Moon, phases of Venus, Star Clusters, Moons of Jupiter in detail, Galaxies! Equatorial mount with lock on both axes. Aluminized and overcoated

3" diameter high-speed f/10 mirror. Telescope comes equipped with a 60X eyepiece and a mounted Barlow Lens, giving you 60 to 180 power. An Optical Finder Telescope, always so essential, is also included. Sturdy, hardwood, portable tripod. FREE with Scope: Valuable STAR CHART plus 272-page "HANDBOOK OF HEAVENS" plus "HOW TO USE YOUR TELESCOPE" BOOK.  
Stock No. 85,050-Q ..... \$29.95 Postpaid  
4 1/4" REFLECTING TELESCOPE—up to 255 Power, all-metal pedestal mount.  
Stock No. 85,105-Q \$79.50 F.O.B. Barrington, N.J.

### SCIENCE TREASURE CHESTS

For Boys—Girls—Adults!  
Science Treasure Chest—Extra powerful magnets, polarizing filters, compass, one-way-mirror film, prism, diffraction grating and lots of other items for hundreds of thrilling experiments, plus a Ten-Lens Kit for making telescopes, microscopes, etc. Full instructions included.  
Stock No. 70,342-Q ..... \$5.00 Postpd.



Science Treasure Chest Deluxe—Everything in Chest above plus exciting additional items for more advanced experiments, including crystal-growing kit, electric motor, molecular models sets, first-surface mirrors, and lots more.  
Stock No. 70,343-Q ..... \$10.00 Postpaid

### WOODEN SOLID PUZZLES

12 Different puzzles that will stimulate your ability to think and reason. Here is a fascinating assortment of wood puzzles that will provide hours of pleasure. Twelve different puzzles, animals and geometric forms to take apart and reassemble, give a chance for all the family, young and old, to test skill, patience and, best of all, to stimulate ability to think and reason while having lots of fun. Order yours now.  
Stock No. 70,205-Q ..... \$3.00 Postpaid



### CRYSTAL-GROWING KIT

Do a crystallography project illustrated with large beautiful crystals you grow yourself. Kit includes the book "Crystals and Crystal Growing" and a generous supply of the chemicals you need to grow large display crystals of potassium aluminum sulfate (clear), potassium nickel sulfate (purple), potassium sodium tartrate (clear), nickel sulfate hexahydrate (blue-green) or heptahydrate (green), potassium ferricyanide (red), and copper acetate (blue-green).  
Stock No. 70,336-Q ..... \$9.50 Postpaid



### MINIATURE WATER PUMP

Wonderful for experiments miniature waterfalls, fountains, HO gage railroad backdrops, etc.: Tiny (2 1/4" x 1 3/4") electric motor and pump, ideal for hobbyists, labs, schools. Pumps continuous flow of water at rate of one pint per minute at a 12" head. With 2 D Batteries in series will pump to 24" high. Runs 48 hrs. on battery. Works in either direction. Self-priming.  
Stock No. 50,345-Q ..... \$2.25 Postpaid



Terrific Buy! American Made!  
OPAQUE PROJECTOR

Projects illustration up to 3" x 3 1/4" and enlarges them to 35" x 30" if screen is 6 1/2 ft. from projector; larger pictures if screen is further away. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volts A.C. current. . . . 6-ft. extension cord and plug included. Operates on 60 watt bulb, not included. Size 12" x 8" x 4 1/4" wide. Weight 1 lb. 2 ozs. Plastic case.  
Stock No. 70,199-Q ..... \$7.95 Postpaid  
FASCINATING NEW KALEIDOSCOPE INSERT: Same unit as above, but provides endless additional projects with everchanging kaleidoscope patterns.  
Stock No. 70-714-Q ..... \$10.00 Ppd.



TEACHERS! Write for Educational Catalog Q-2  
Edmund Scientific Co., Barrington, N. J.

### MAIL COUPON for FREE CATALOG "Q"

Completely new 1965 Edition, 148 pages. Nearly 4000 BARGAINS.  
EDMUND SCIENTIFIC CO.  
Barrington, New Jersey  
Please Rush Free Catalog "Q"

Name .....  
Address .....  
City ..... Zone ..... State .....

