

## SPACE

# Color Pictures of Moon

► WHEN THE UNMANNED spacecraft Surveyor lands on the moon in 1964 it will take color TV pictures of the surface to find out what it is made of.

The color analysis of the lunar landscape will be made by sliding blue and red filters in front of the TV camera as it takes pictures that can be seen on a TV screen on earth by the ground observer and operator of the vehicle.

Jack S. Green of Hughes Aircraft Co., Culver City, Calif., told SCIENCE SERVICE that the TV picture will be seen moving downward over the screen at the rate of one frame a second, compared to ordinary TV which moves over the screen at a clip of 16 frames a second.

One of the problems to be solved in the ground control of the Surveyor was how the operator tells the craft what to do. A system of number codes has been worked out so that each code number in a series will be sent to the vehicle to give a specific command. Such a command could be to tell the craft "fold out your landing gear" or "take a TV picture."

Some information from the moon vehicle will be sent back to earth by telemetry by means of a radio link using standard techniques of frequency and digital modulation.

A ticklish problem has been how to unscramble and display this information from experiments so the ground observer

can read and interpret it. This information will come in as sound signals carried by the radio frequency. The unscrambling can be done with filters and digital decoders.

It will come in two forms to the operator. Meter readings tell the position of a camera angle, or of the gyros. Light signals give information as to whether the TV camera is on and whether the power of the gyro system is functioning.

If something should go wrong with this communication system and the trouble is in the Surveyor, the operator could push a button, switch the equipment off and go to a duplicate set of equipment provided in the space vehicle. If the operator suspects he made an error, he could repeat the experiment to check if the new figures look more reasonable for the type of experiment being performed. If the ground equipment should malfunction, there is also a duplicate ground system.

Once the Surveyor has soft-landed on the moon it is scheduled to be operated from one to three months. It will provide important information about the terrain of the moon necessary for manned landings. It may also tell scientists whether lunar craters are volcanic or meteoritic in origin, or both. Seven Surveyors in all are scheduled to explore the moon.

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## MILITARY SCIENCE

## Supersonic Jet Fighter For Joint Navy, AF Use

► THE DEFENSE DEPARTMENT has contracted for its biggest fighter program since World War II.

A revolutionary new supersonic jet fighter for use both by the Navy on carriers and by the Air Force from land bases will be built by the Convair Division of General Dynamics Corporation at Fort Worth, Texas, under the Defense Department contract. The plane will be able to reach speeds two and a half times the speed of sound at high altitudes and exceed the speed of sound at sea level.

The tactical fighter, experimental (TEX) program is expected to cost close to \$5 billion. There will be two versions of the plane, one capable of operating from land bases and one from Navy carriers. By using the planes for both the Navy and Air Force, officials said there will be a saving of \$1 billion.

Twenty-two test models will be built during the next two and one-half years at a probable cost of close to \$750 million. Following tests, 1,500 operational models in the two versions will probably be built.

The airplane will be capable of retracting its wings into a triangular shape for flights at speeds up to 1,650 miles an hour and will carry all the latest types of nuclear and conventional weapons. In its operational version, the fighter will be known as the

F111. The Navy version will be shorter and lighter than the Air Force type and will weigh about 60,000 pounds. The Air Force version is expected to weigh 70,000 pounds, making it the heaviest fighter ever built.

The weight, however, will not make it cumbersome, according to the Defense Department. It will be able to "take off from rough air fields in forward areas, and will have a short landing capability."

Another plane to be known as the VAX may be built for close troop support.

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## AERONAUTICS

## Bird Strikes Cause Nine Airline Accidents

► NINE "bird strikes" since 1951 have caused commercial airplane damage varying from bent wings to fatal crashes. The ninth victim in the bird vs. airplane struggle is the United Airlines Viscount which crashed outside of Washington, D. C. (Nov. 23), killing all 17 persons aboard.

The worst bird accident in U.S. air history occurred in 1960 when starlings struck the number one, two and four engines of a Lockheed Electra plane on a take-off from Boston. Sixty-two of the 73 persons aboard were killed.

Other non-fatal accidents have been caused by seagulls, a swan, geese and ducks. They have put out engines, damaged nose cones and fuel cells, bent wings and, in one case, struck the tail rotor of a helicopter. With these bird encounters the planes were able to land safely.

Planes which have been struck include the DC-3, the Convair-340 and the Convair-240 which carry typical loads of 30 passengers, the DC-4 and the Viscount which carry 40 passengers and the Lockheed Electra which may have 70 passengers aboard.

It is known that a bird may strike a plane with the force of a "soft cannon shot." Geese and swans in flocks may be picked up by radar and are known to fly between 4,000 to 6,000 feet in altitude, but it is difficult to see and avoid a single bird, even a large one.

In efforts to eliminate the "bird strike" accidents the Federal Aviation Agency has been conducting research programs for several years. In a Lockheed wind tunnel in Burbank, Calif., starlings and seagulls have been sent into engines to study loss of engine power, and tell how long it takes an airplane to regain power loss caused by a bird getting into the engine.

At the National Aviation Facilities Experimental Center in Atlantic City, birds will be fired through a long-barrelled gun-like instrument to test engine design for openings which allow birds to enter.

Airports are discouraging birds from competing with the airplanes. Many major airports across the country remove plants and food cans and patrol runways by jeep. Toy cannons are fired at Idlewild Airport in New York, Logan Airport in Boston, and airports in Washington to frighten the birds away.

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National Research Corporation

**FIRE POWDER** — Ultrafine metal powders, less than one-millionth of an inch in particle size, developed at the National Research Corporation, are being tested by project manager, Paul Raymond. The powders which ignite spontaneously can be used in chemical processes, powder metallurgy and for rocket fuels.