

Dr. James R. Hundley, sociologist at Michigan State University, seconds these comments, particularly in relation to the police.

There is usually a period of hours or even a day after a precipitating event before looting and burning gets underway, he says. That is the time city officials and police officers could use to settle specific complaints and very possibly offset a riot. But they must know who the ghetto leaders are. The truth is that most are ignorant of the ghetto, says Dr. Hundley.

Police, for example, are apt to either start rounding everybody up indiscriminately or hang around doing nothing while looters plunder under their noses.

In fact, the latter is what happened in both Watts and Detroit. In Watts, police officers not only stood around, but they indulged in catcalls.

Police training in race relations is only skin deep, says Dr. Spiegel. "It's a fraud." ♦

#### A RUSSIAN FIRST

### A Maser in Orbit

Three years ago, the Mariner 4 spacecraft flew by the planet Mars and took 21 pictures of its crater-strewn surface. The photography took only 25 minutes, but broadcasting the images to earth required 10 full days. It was a miracle, in fact, that the signals reached their home planet at all, since by the time they got to earth their strength was down to one trillionth of a watt. Any stray bit of noise either from space or from the receiving equipment could have hidden them completely.

Communication from deep space is a difficult problem, and will become even more critical when men begin to travel farther away than the moon. The limited amount of power available on a spacecraft means that signals going millions of miles must either be sent very slowly or transmitted over a very narrow frequency band to ensure that they will reach their destination. Mariner 4 (like Mariner 5, which is now heading for Venus) had to cut its data transmission rate by 75 percent when it reached five million miles from earth, even to produce the incredibly weak signal that it did.

Now a paper published in the Soviet Union has revealed that 21 months ago the Russians took what may have been a large step toward solving the deep space communication problem—a step that has barely been considered by the U.S.

On Nov. 26, 1965, the Soviet Union

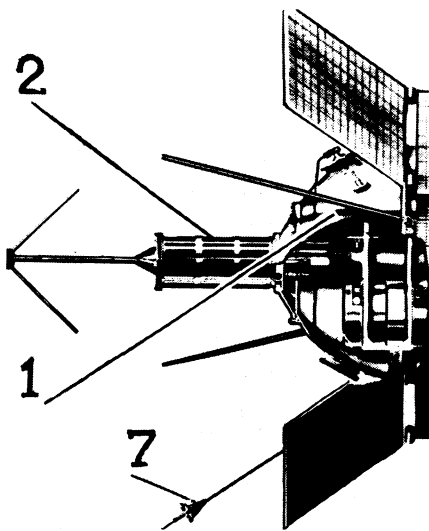
launched the 97th satellite in its catch-all Cosmos series, equipped with an instrument which had never been in space before: a maser. Maser, which is now such a household word among scientists that it doesn't even rate capital letters, stands for Microwave Amplification by Stimulated Emission of Radiation. Used in space communications—as it is in several U.S. ground stations, including the communications satellite link at Andover, Maine—a maser acts as an amplifier by adding energy to the incoming signal.

The maser's advantage over conventional electronic devices such as tubes and transistors is that it produces no noise of its own, which could mask

and compactness. A gas maser itself is hardly compact, but it does not require the huge magnet that can often make crystal masers weigh more than half a ton.

The Soviet experiment was allegedly designed as a first step, to see how well the maser would hold its intended frequency in space. "It was found to operate well at different altitudes above the earth, inside and outside the radiation belts, when illuminated by the sun and in the earth's shadow," says Yur'yev. The Russians measured the stability of the orbiting maser by repeatedly comparing its frequency with three identical masers on the ground.

If Cosmos 97's maser was indeed a communications experiment—the satellite burned up in the atmosphere last April—it could be part of plans for an orbiting relay station, to pick up signals from deep space probes before they are cut by earth's atmosphere, then retransmit them to the ground. However, there is another possibility. It was suggested by one maser specialist last week that "the communications angle could be just a big cover-up." The advantages of a maser-equipped relay satellite over a direct ground link would not be enough to justify the cost, he says. Instead, he believes, the Russians could have been measuring the Doppler shift of the maser's frequency as it whirled around the earth in order to obtain vital military geodetic information, such as the exact distance from Moscow to Washington. ♦



Cosmos 97 and its maser (2)

#### CLOUD SATELLITES

### Camera's Eye Too Slow

Astronomers say they can see cloud satellites of earth in their appointed places—but photographs have so far failed to reveal them. The scientists hope to try again in the fall with faster film.

The attempt would be made from a jet airplane carrying cameras loaded with the newly available Kodak SO-166 film, which has been used successfully in dim light photography at ASA speeds of 6,000. Plans for the fall flight are, however, not yet definite.

Existence of equilibrium points orbiting earth in the same path as the moon was first postulated in 1772 by the French mathematician, Joseph Louis Lagrange. He calculated that there are five points in the earth-moon system, or in any two-body system in which stable equilibrium has been established (and where debris could accumulate). Only two such libration points in the earth-moon system have been re-

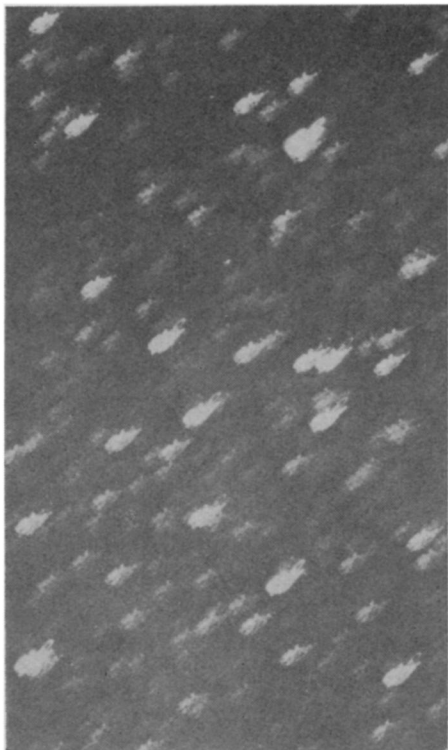
the barely perceptible signals from space. Even the virtually inaudible hums and pops of the most expensive home high-fidelity system would become a deafening cacophony of roars, barks and crashes if amplified by the super-sensitive equipment of space communications. The source of this noise is usually heat, which causes uncontrolled electrons to come boiling off the cathode of a tube. Transistors have other problems. A maser, however, has neither the problems of the transistor nor, since it is a cryogenic device, the heat produced in a tube.

Cosmos 97 carried an ammonia maser, which emits its chosen frequency from oscillations in molecules of gas. Soviet author Z. I. Yur'yev says that the ammonia version has several advantages over ruby crystal masers for use in space, including simplicity, resistance to vibration, long lifetime

portedly detected photographically (SN: 3/26/66).

The most recent evidence concerning a pair of dust-laden clouds in lunar orbit comes from Dr. Charles Wolff and Lawrence Dunkelmann of the National Aeronautics and Space Administration's Goddard Space Flight Center in Greenbelt, Md., and Louis C. Haughney of NASA's Ames Research Center, Moffett Field, Calif.

The three scientists took photographs of the regions where the cloud satellites were predicted to be from a jet airplane flying nearly 40,000 feet over the Pacific Ocean and 600 miles west of Baja California, a distance sufficient to eliminate all interference from artificial lighting. They used Tri-X film and exposures of one, three and nine minutes.



NASA

Only stars, no cloud satellite.

Although observers on the flight reported they saw luminous areas where the clouds should be, the photographs showed no cloud satellites.

This does not mean that the clouds do not exist. It does mean that the NASA scientists could not record the objects on film because they are so faint and therefore very difficult to photograph against the background of other competing light sources.

That is why, reporting their results in the July 28 *SCIENCE*, they urge further observations of the cloud satellites from airplanes carrying cameras equipped with the super-fast film.

The first astronomer to report having found the faint objects photographically was Dr. Kasimir Kordylewski of Krakow Observatory in Poland. In 1961 he said that a 10-year search for the elusive clouds culminated in successful photographs of the luminous patches in March and April.

No one in this country, however, has had a chance to examine the film. ♦

#### GENETICS

### Hope from Diabetic Mice

Four million diabetics in the United States and another 30 million to 60 million around the globe could be indebted to a strain of diabetic mice being bred in Bar Harbor, Maine.

In diabetes research, "this mouse is the best working model to date," one of its discoverers, Dr. Katharine P. Hummel, says. "It is the kind of discovery that is leapt upon by researchers, because the diabetes in the mouse resembles that in mature humans." A satisfactory animal subject had eluded diabetes researchers, until the mouse was found.

**The latest research** with mice has given hope that their diabetes may be discoverable five days after birth instead of three weeks, when obesity, a symptom, becomes evident.

If diabetes can be found early, study of the developing syndrome will be possible for the first time.

Dr. Douglas L. Coleman, a biochemist and collaborator on the mouse work at Jackson Laboratory, reported this and other progress in research last week in Stockholm, Sweden, at the International Diabetes Federation Congress. He found that the mice—genetically—are cooperative enough to color-code themselves.

"The most recent genetic studies," he says, "have established that the diabetes is linked to two coat-color genes, brown and misty. This information can be used to establish lines in which all the diabetic mice will be of one coat color while the normals and the carriers will be another."

**The diabetic mouse** was first discovered because of its tendency to obesity and its markedly increased water consumption and urinary output—symptoms of human diabetes also.

The mice, however, do have a drawback as experimental subjects: Their life-span is four to six months. Dr. Coleman believes that this is not long enough for some of the complications of diabetes to appear. There were no cataracts or retinal hemorrhages in the eyes of the mice at any age. Kidneys, hearts and lungs were normal, and the thyroid, pituitary and adrenal glands showed no obvious abnormalities.

Also like other mutant mice, the diabetic ones cannot reproduce, and their ovaries must be transplanted into healthy females before ovulation can take place. Because both males and females are nonfertile, the diabetic stock must be maintained by the mating of carriers. The disease is inherited through transmission by both parents.

But because scientists believe human diabetes also has a genetic basis, hope for understanding the cause and ways to prevent the disease has arisen from the mouse studies.

In the diabetic mouse, it is the islets of Langerhans, in the pancreas, that are the only organs to show alterations with the advance of the illness. The disease develops in two stages, and in the advanced stage the mice are resistant to insulin treatment.

**The reason** for this remarkable insulin resistance in older mice is not yet known, Dr. Coleman says. It does not appear to be related to the degree of obesity.

But the researchers did find that when the pancreas of diabetic mice is



Jackson Lab.

Adult, obese diabetic mouse.

not stimulated by the effects of almost constant eating, the islet tissue has an opportunity to rebuild its stores of insulin.

Both men and women of all ages get diabetes. It has been reported in a nine-day-old infant and in a woman of 99, but it is predominantly a disease of middle and old age. ♦