

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.

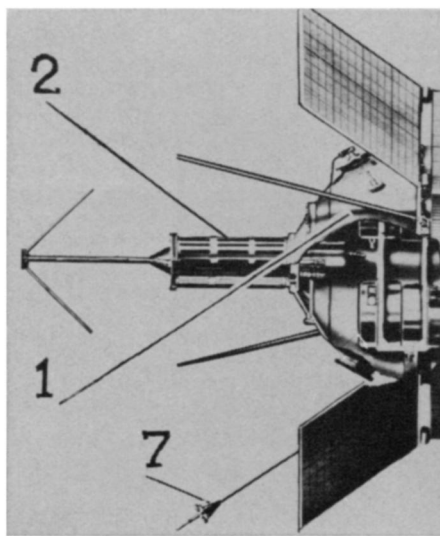
Communication from deep space is a difficult problem, and will become even more critical when men begin to travel farther away than the moon. The limited amount of power available on a spacecraft means that signals going millions of miles must either be sent very slowly or transmitted over a very narrow 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



Cosmos 97 and its maser (2)

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

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 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. ♦

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-