

# Orbiter: Flying Photo Lab

Lunar Orbiter 2 is more than a mere photographer—it develops its own pictures (see cover). Neither of the other U.S. unmanned mooncraft series, Ranger and Surveyor, have been photographers at all. They have been only TV cameramen, relaying live images to earth to be recorded and then made into pictures.

Mariner 4, which passed within 5,700 miles of Mars in July 1965, also used a television camera, but stored its images on magnetic tape to be played back later. This was necessary because at Mariner's great distance from earth, the pictures, which were recorded in only 25 minutes, required 10 days to play back.

The photographic system on Orbiter 2 is virtually identical with that of its predecessor, except for two changes, both designed to lick the same problem: a cantankerous shutter that kept firing itself at unlikely moments, such as when the film was being wound.

When the first photos were received on earth from Orbiter 1's high-resolu-

tion camera, scientists immediately noticed that they were peculiarly smudged. This could mean that they were taken while the film was in motion. An elaborate check of the data showed that stray electric currents from the camera's electrical system were triggering the shutter accidentally.

The remedies were twofold. Instead of the instantaneous electrical burst that operated Orbiter 1's shutter, Orbiter 2 has been made to require a longer pulse of 0.8 milliseconds, at 1.5 volts. Just to be on the safe side, NASA provided 50 millisecond pulses of 6 volts. In addition, the circuitry was redesigned so that it produces far fewer stray bursts, and those that do occur are too weak to fire the shutter anyway.

The Lunar Orbiters use a photographic system called Bimat, developed by Eastman Kodak. A 200-foot roll of film, relatively "slow" in light sensitivity but practically immune to radiation fogging during the flight from earth, is first exposed by Orbiter's two cameras—high and low resolution.

Then it is run against a roll of processing material, soaked before launching in developing chemicals. The processed pictures are dried, then stored on a take-up reel until the spacecraft is signaled to play them back, which it does by TV scan.

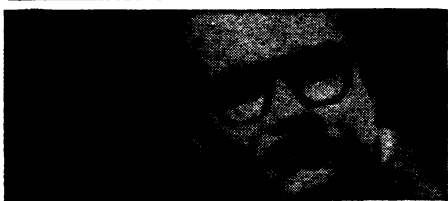
The Bimat system has higher resolution and great weight savings over Mariner-style magnetic tape. But it does pose its own problem: heat. Since the chemicals are essentially liquid, heat can have a deteriorating effect on them. Trying to avoid this seemingly small problem affects the entire heat balance of the spacecraft. The Bimat itself must be stored far enough from hot rocket nozzles and electronic components to avoid damage, but what about the sun? Orbiter 2 made almost its entire flight to the moon with the sun shining full on the Bimat side. Scientists knew in advance that this would happen, so they wrapped the whole spacecraft, except for solar panels and rocket nozzles, in a heat-reflecting aluminized plastic blanket.

## GYNECOLOGY

## Parasite Effect Studied

Congenital blindness in the newborn child and certain spontaneous abortions may be caused by the same parasitic infection, if the abortions aren't nature's way of preventing the birth of blind children.

A team of doctors from the University of California at Los Angeles Medical School, the National Institute of Neurological Diseases and Blindness, and the Southern California Permanent Medical Group conducted blood tests of 3,796 women of childbearing age for evidence of toxoplasmosis.



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This parasitic infection usually does not produce symptoms in the mother. It may, however, cause blindness and other abnormalities in her offspring.

The study was carried out over a five-year period. Initial blood tests were made in most shortly after spontaneous abortion or childbirth. Blood tests were also made during subsequent pregnancies. Twenty-five percent of the group showed evidence of the infection.

It was found that those women with high levels of antibodies against toxoplasmosis had significantly greater frequency of spontaneous abortions than those with low levels or none. Among 36 women with high antibody levels there were 20 abortions in 89 pregnancies. In the group of 3,760 women with low levels of antibodies or none there were 1,056 abortions in 8,189 pregnancies.

Three subjects in the high antibody group repeatedly aborted pregnancies for no apparent reason. At least nine other subjects in the high group had pregnancy histories suggesting a possible relation of the infection to abnormal pregnancy outcome.

Associated in the study were Drs. Margaret H. Jones, J. L. Sever, J. G. Hallatt, E. D. Goldenberg, Carol Bonnet, M. R. Gilkeson and J. M. Roberts.

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