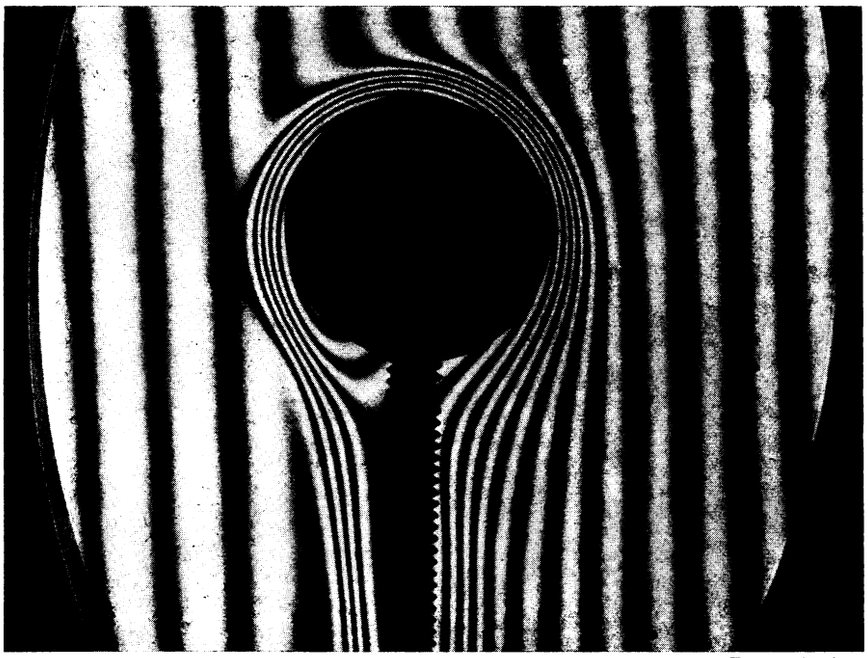

Fremont Davis

INTERFEROMETER PATTERN—This zebra-like pattern was produced by adjusting the mirrors of a new interferometer developed by A. Wiley Sherwood of Aerolab Supply Company. The pattern may be used to determine gas density.

SPACE

Orbiting Reactor Works

➤ THE UNITED STATES launched the first small nuclear reactor to power space exploration from an earth-circling satellite on April 3.

The little atomic power plant converts the heat of fissioning uranium directly into electricity to run the various instruments and experiments on board.

One of the tests is of an ion propulsion engine, which is a low-thrust rocket. Evidence concerning whether or not the ion engine was working was obscured by noise as of April 9.

The nuclear reactor is called SNAP-10A, for Systems for Nuclear Auxiliary Power. The reactor as well as the entire system was thoroughly ground tested to assure safety during launch and operation.

Fissioning of the uranium started on April 4 when the satellite was in an orbit at a sufficient height that the radioactive material will decay to safe levels after shutdown of the reactor, planned to operate only for a year.

Nuclear generators in the SNAP program have been used in space and on the earth's surface, and also on and under the oceans. However, they operate as batteries releasing power from the heat generated when radioactive isotopes break up.

The SNAP flight test is designed to determine how well a nuclear reactor power system operates in space.

This is necessary not only for satellites but also for future trips to the moon and to the planets, when a reliable power supply of several thousands of kilowatts will be essential.

The 970-pound device was boosted into a polar orbit of 700 nautical miles by an Atlas Agena rocket launched from Vandenberg Air Force Base. The space power system was developed by Atomics International, a division of North American Aviation, Inc., Canoga Park, Calif.

Heat produced by the fission of enriched uranium 235, moderated by zirconium hydride, is converted directly into 500 watts of electricity by thermoelectric devices.

A radio command from the ground started the reactor, which weighs only 250 pounds. At its heart is the core vessel, a steel tank nine inches in diameter and 15½ inches high.

Each element consists of a rod of fuel-moderator material, a homogeneous mixture of zirconium hydride—the moderator—and uranium 235, the fuel. The uranium 235 fuel accounts for 10% of the weight of the mixture.

If everything goes as planned, the reactor system will not reenter earth's atmosphere for 3,500 years.

The Russians also have under development a direct conversion reactor called "ROMASHKA," which uses uranium 235. This reactor is reportedly too heavy for space use although it has produced electricity from nuclear heat for more than 500 hours.

• Science News Letter, 87:246 April 17, 1965

TECHNOLOGY

Device Enables Phone Communication for Deaf

➤ A BEEHIVE flashing lamp enables a totally deaf person to communicate via telephone.

By using this device, with a pre-determined code, the distant party can acknowledge a deaf person's telephone conversation with a voice response that in turn flashes a lamp. Two people familiar with a code system can thus communicate easily via telephone. The devise was developed by the Bell Telephone System.

• Science News Letter, 87:246 April 17, 1965

PHYSICS

Light Wave Measures Heat and Density

➤ DEVELOPMENT of a new interferometer makes possible measurements of temperature and density around an object by use of a light wave of unchanging standard.

A beam of intense light from a mercury vapor tube is fed into one end of the interferometer. This beam is split by a semi-reflecting mirror into two parts. One-half of the beam goes through a straight optical path to a screen. The other half goes through a longer optical track.

Mirrors reflect it through a box-like chamber, then back in the same line with the straight-through half of the beam. It is also focused on the screen.

The two halves of the beam of light arrive at the screen out of phase, canceling each other. Although the light beams started in phase, one took one-half a wavelength longer to reach the screen. In this case the screen appears rather dark.

When a gas of lower density than air or when hot, less dense air is placed in the chamber so that it intercepts the longer half of the beam, the speed of the light is changed and the beam reaches the screen before the light is completely out of phase. The image on the screen appears brighter in this case.

A very beautiful pattern usually results which can be measured to determine the density of the gas or air. By interpretation, the temperature of the air can be determined at many points around an object.

The interferometer can be set in a different manner to produce a zebra-like pattern on the screen. This is done by moving the mirrors of the longer half of the beam so that one edge of the beam gets to the screen a little before the other. Then the two halves of the beam are in and out of phase all across the screen, producing a series of parallel lines.

When a test object is put in the chamber the lines are distorted in an interpretable pattern. Differences of a five-thousandth of an inch can then be read with ease.

A. Wiley Sherwood of Aerolab Supply Company, Laurel, Md., designed and made the first of these interferometers for Pennsylvania State University.

• Science News Letter, 87:246 April 17, 1965