

## ROCKETRY

# Plasma Engine Developed

The plasma engine has been successfully laboratory tested with the harnessing of the shock wave generated by an electric current discharged through air in a cylinder.

A PLASMA ENGINE some day may power earthmen to Mars.

A laboratory triumph was described by Milton J. Minneman of Republic Aviation Corporation at the National Convention on Military Electronics meeting in Washington.

He disclosed that Republic scientists have been able at last to harness the brief, powerful shock wave generated when a strong electric current is discharged through air in a cylinder.

By using curved electrodes in the cylinder and by attaching a nozzle to its bottom end, the scientists were able to direct the shock wave to produce useful thrust. In experiments it blew a little disk into the air with a force of 4,000 pounds.

Results of this laboratory setup enabled the scientists to prove feasibility for a plasma engine for use in some future space ship.

They calculated that a 27,300-pound space vehicle, including a 5,000-pound instrumented payload, could make a one-way trip to Mars in "just over eight months," Mr. Minneman said, using a refined plasma engine.

The engine would give rapid bursts of low-level power over a long period. It could develop 9,000 pounds of thrust per pulse. But operating at pulse rate of 500 pulses per second, with each pulse lasting only 0.39-millionths of a second, an average thrust of only 1.8 pounds would be developed.

Although this may not seem much, Mr. Minneman commented, the engine is specifically designed to work outside the earth's gravity and its power would be adequate.

It could be used on a space ship that could be rocketed into space by other vehicles, or perhaps built there.

A statistic from the experiment that may interest rocket engineers is the plasma engine's "specific impulse" of 1,700 seconds. This is the rocket engineer's equivalent of "miles-per-gallon." A specific impulse of 1,700 seconds means that one pound of thrust is delivered for each pound of fuel over an operating period of 1,700 seconds. Specific impulse of the old V-2 rocket was 200 seconds; chemical rockets with specific impulses of 400 seconds are theoretically possible. Mr. Minneman said plasma engines probably could be designed to have specific impulses of 5,000 seconds.

Even "pinball machines" have troubles in successfully launching and recovering satellites.

During the Military Electronics convention, one of 78 exhibits shown resembled a huge pinball machine. Under glass it contained the earth and, at some distance, the moon.

A "player" jiggled switches to "fuel up" and make other pre-launch preparations, then pressed a button to blast off a satellite to the moon. The machine buzzed but nothing happened.

The attendant beat on the machine, but the satellite, a little ball, apparently had not been recovered from its previous shot. It appeared to be lost somewhere in the dark mechanical reaches of its own universe.

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## PUBLIC HEALTH

## 1,903 Water Supplies Naturally Fluoridated

WATER SUPPLIES of 1,903 cities and towns in the United States contain enough fluoride naturally to prevent two out of three dental cavities.

The combined population of these cities

and towns, about 7,000,000, added to about 35,000,000 people living in 1,800 communities practicing controlled fluoridation, indicates that one of every three people in the country using central water supplies now drinks fluoridated water.

These figures were contained in a report published by the U. S. Public Health Service based on data compiled by the dental directors of all state health agencies.

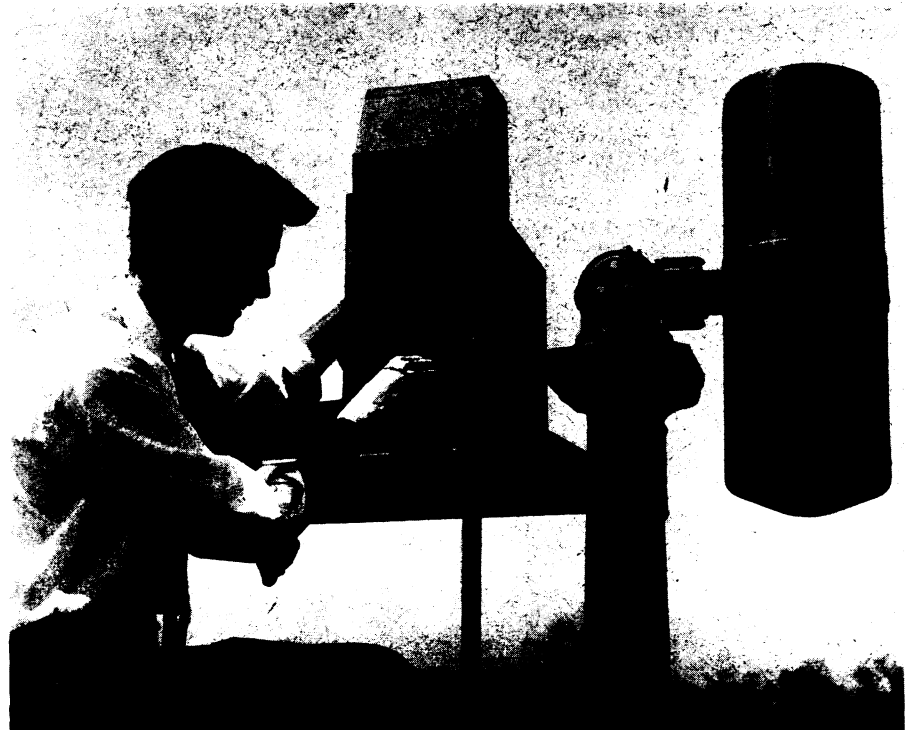
The 1,903 communities with naturally occurring fluoride are distributed throughout 43 states. The community populations range from less than 50 to more than 500,000, with 35% having more than 50,000 inhabitants. Thirty-eight percent have populations from 5,000 to 50,000, and 27% have less than 1,000 inhabitants.

Texas, the state with the most natural fluoridation, has 2,700,000 persons in 356 towns using naturally fluoridated water. New Mexico has 465,000 people, or 68% of the total population, living in communities with naturally fluoridated water.

Each of 12 other states—Illinois, Iowa, California, Colorado, Florida, Idaho, Indiana, Kansas, Louisiana, Michigan, Ohio and Wisconsin—has at least 100,000 people served by water with natural fluoridation.

The fluoride found naturally is identical in its dental effect to the fluoride used in controlled fluoridation, the PHS reported.

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**SATELLITE SPOTTER**—Barrel-like unit with "eye" (at right) is an infrared scanner and detector developed under an Air Force research program to explore the possibilities of detecting and tracking satellites by infrared techniques. Developed by the Avion division of ACF Industries, the unit scans a 40-by-90-degree segment of the sky every three seconds in its search for infrared emissions from orbiting satellites. Indication of detection would appear as a blip on scope, being adjusted in the photograph by Avion technician. The unit, known as CODES (Commutating Detection System), is said to be more than five times as sensitive as other infrared detectors for its weight, power, cost and simplicity. It was demonstrated at the Military Electronics National Convention in Washington.