SPACE

Little Reactors for Space

As man's space explorations require more and more power, the U.S.-USSR race is entering the field of small, lightweight atomic reactors—By Watson Davis

See Front Cover

➤ LILLIPUTIAN atomic power plants light enough to be rocketed into the challenging frontier of the vast reaches beyond the earth are in advanced stages of construction by both the U.S. and Russia.

Little atomic reactors converting heat of uranium fissioning directly into electricity will soon be powering America's penetration into space, first for satellites and then on the moon and even Mars.

A team of scientists from Atomics International, subsidiary of North American Aviation, described the 500-watt thermoelectric system, called SNAP 10A, to the Third United Nations International Conference on the Peaceful Uses of Atomic Energy in Geneva.

It weighs only 950 pounds, including 215 pounds of enriched uranium-235, zirconium hydride moderator and the thermoelectric converter made of an alloy of silicon and germanium.

SNAP 10 is almost ready to take to space with its first flights due next spring. It has been under development since 1958.

The American scientists, H. M. Dieckamp, R. Balent and J. R. Wetch, told the conference that man's exploration close to earth and to the outer regions of the solar system will require more and more power.

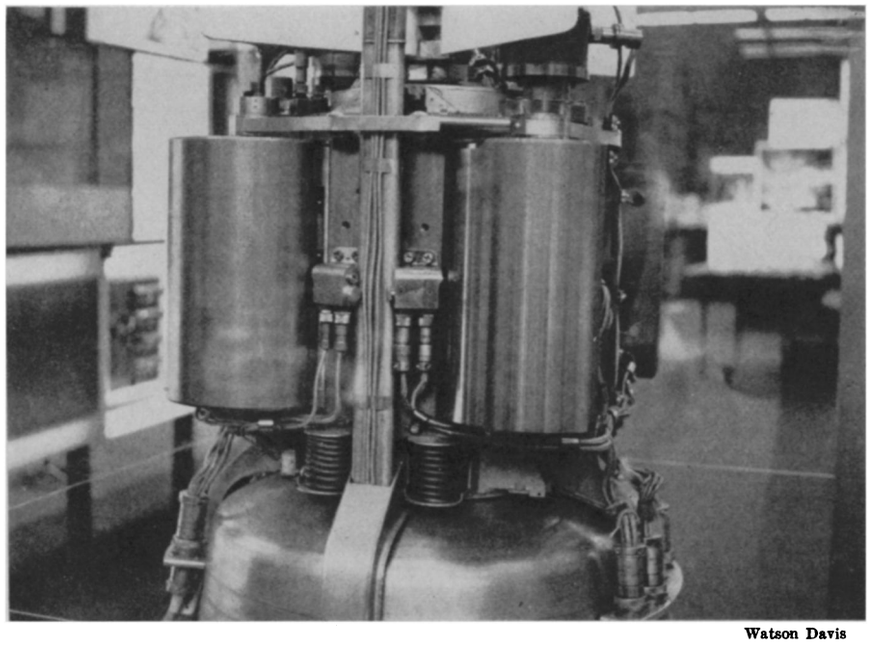
The space power plant they have built is the first step to providing 100 kilowatts of energy for future communications satellites that will broadcast several TV channels direct to individual homes on earth. Future power plants of the SNAP 10A type are foreseen for 20- to 40-man orbital space stations and for a semi-permanent base on the moon.

A team of 25 Russians reported the Soviet's direct conversion reactor named "ROMASHKA." It uses uranium-235 and a silicon-germanium converter of heat into electricity. It is judged to be too heavy for space use but it has produced electricity from nuclear heat for a reported 500 hours plus.

There is a U.S.-USSR race in power for space as there is in space vehicles and satellites.

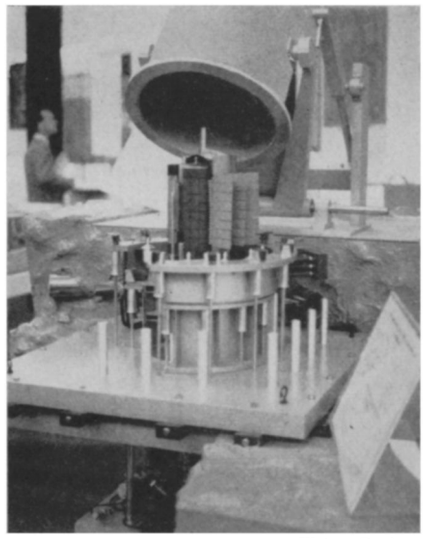
The U.S. has about two dozen other types of reactors for use in space and remote locations, all except SNAP 10A powered by radioisotopes obtained as by-products of the spent fuel of the big reactors. Also in the future there will be a U.S. SNAP 50 reactor for space propulsion with electrical power up to a thousand kilowatts. This will be a true fission reactor, not of the isotope variety. It will come along at the end of the decade.

For the name of their small-sized reactor the Russians went flowery as ROMASHKA is the Russian name for the chamomile plant and flower. The U.S. has stuck with the use of code names composed of initials —SNAP designating "Systems for Nuclear Auxiliary Power."



Watson Davis

SNAP 10A—This radioisotope generator was shown by the United States at the Conference.



Watson Davis

ROMASHKA — This small-scale model of a direct conversion reactor was exhibited by the USSR at the Third United Nations International Conference on the Peaceful Uses of Atomic Energy in Geneva.

There are a number of SNAP isotopic devices in use for remote weather stations, navigational and light buoys, and for communication and military satellites, some top secret.

At the Geneva conference a SNAP 7F, whose power comes from strontium-90, powered a NOMAD weather boat, a duplicate of a weather station actually in service in the Gulf of Mexico.

The floating atomic weather station, seen on this week's front cover, was one of the features of the U.S. exhibit at the conference.

The NOMAD series of unattended weather vessels, anchored at sea, transmit weather information back to shore periodically by means of power provided by a long-life SNAP-7 nuclear generator. The SNAP-powered exhibit (an actual vessel, not a model) broadcasts weather information from the exhibit hall to a receiver and "read-out" equipment located in the display.

For power purposes for commercial use, the small power producers like SNAPs, whether nuclear or isotopic, will not compete with the big reactors that use nuclear heat to create steam to turn turbines and generators.

The thermoelectric direct conversion of heat into electricity without moving parts and use of the more complicated conventional power cycle is not yet ready for large installations and probably will not be for decades.

Every home with its own little nuclear reactor is not to be expected.

For military use and in places where cost is not a first consideration, the SNAP devices will be widely applied in coming years.