THE AMERICAN SCENE *(Continued)*

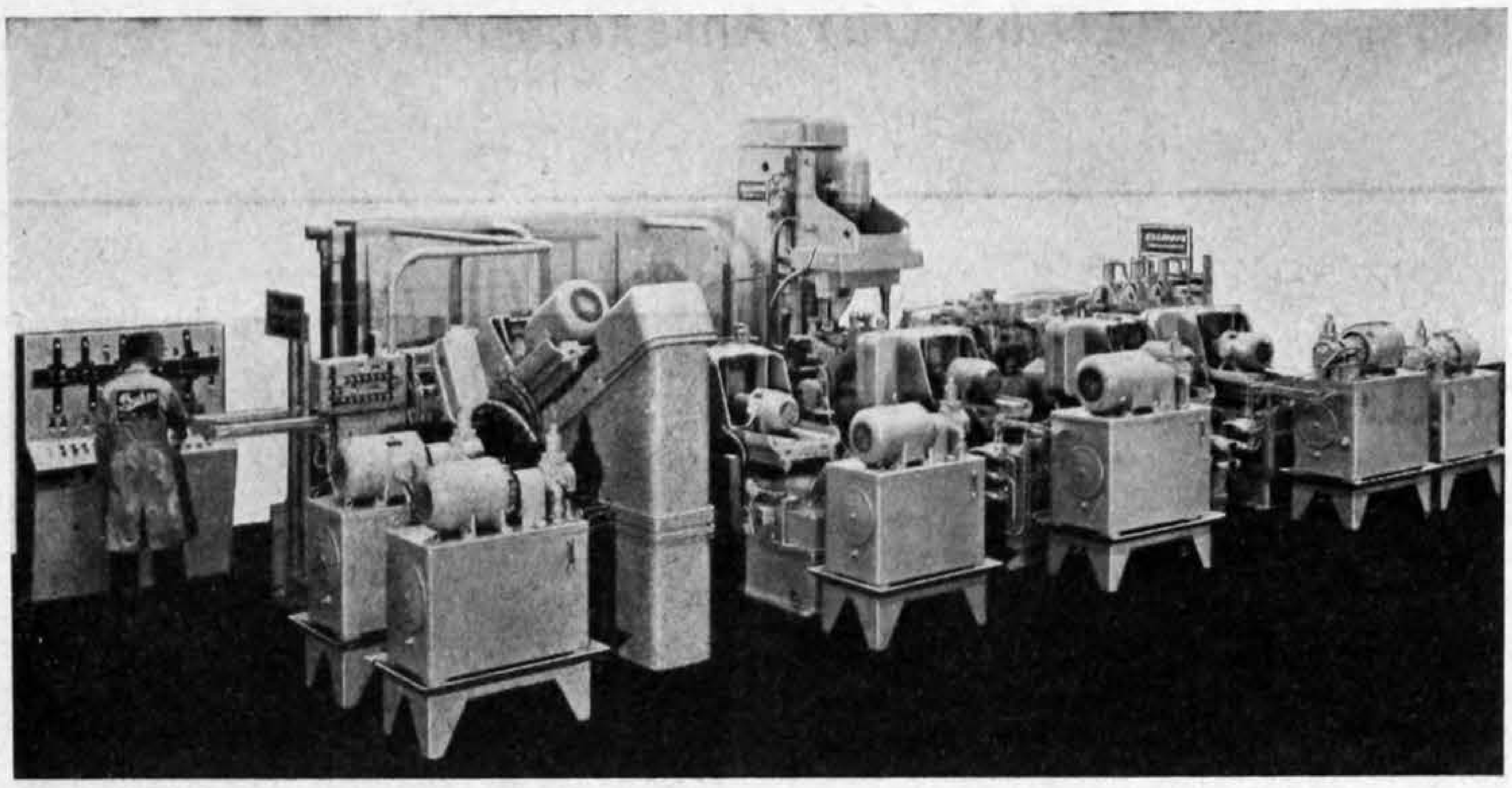


Fig. 1—" Economatic " seventeen-station transfer machine for machining die-cast aluminium cylinder heads

one for the first part of the machine and another one for the second part after the workpiece has been rotated 90 deg. Another aspect is that drill stations are provided as a safety measure even for holes which are cored during the die-casting process.

The ease and speed in working aluminium as compared with cast iron was taken into consideration during preliminary design work. The operations consist of complete drilling, chamfering, boring, reaming and tapping. The machine has seventeen working and idle stations and is separated into two sections by a 90 deg. turnaround. The cylinder heads are skidded along rails through stations 1 to 13 by a rotating transfer bar and are moved through the last three stations by a walking beam. The index step is longer in the first section of the machine because the head is moved lengthwise there. After the operator manually loads a cylinder head at station 1 and presses the " start " push-buttons, the machine automatically processes the part on a nineteen-second cycle. The control of the two sections of the machine is integrated so that the parts pass from one to the other without interruption.

All the cutting tools used on this machine are specifically designed for cutting aluminium and are operated at higher speeds and feeds than would be the case with cast iron. Other major differences between these tools and those for cast iron are that the drills used have fast spirals and polished flutes. All other cutters also have polished flutes.

With die castings, many holes are cored. This does not, however, substantially reduce the number of operations as might at first be expected. Drills are run through these holes to make sure that they are clean. Such " drilling of air " is justified because 100 per cent inspection of the parts for correct hole size and shape would otherwise be required before finishing or tapping. Deep, small holes are cored about half-way through the part and are drilled the remaining distance. Although the number of operations is not much reduced, the amount of work required to finish these parts is considerably less.

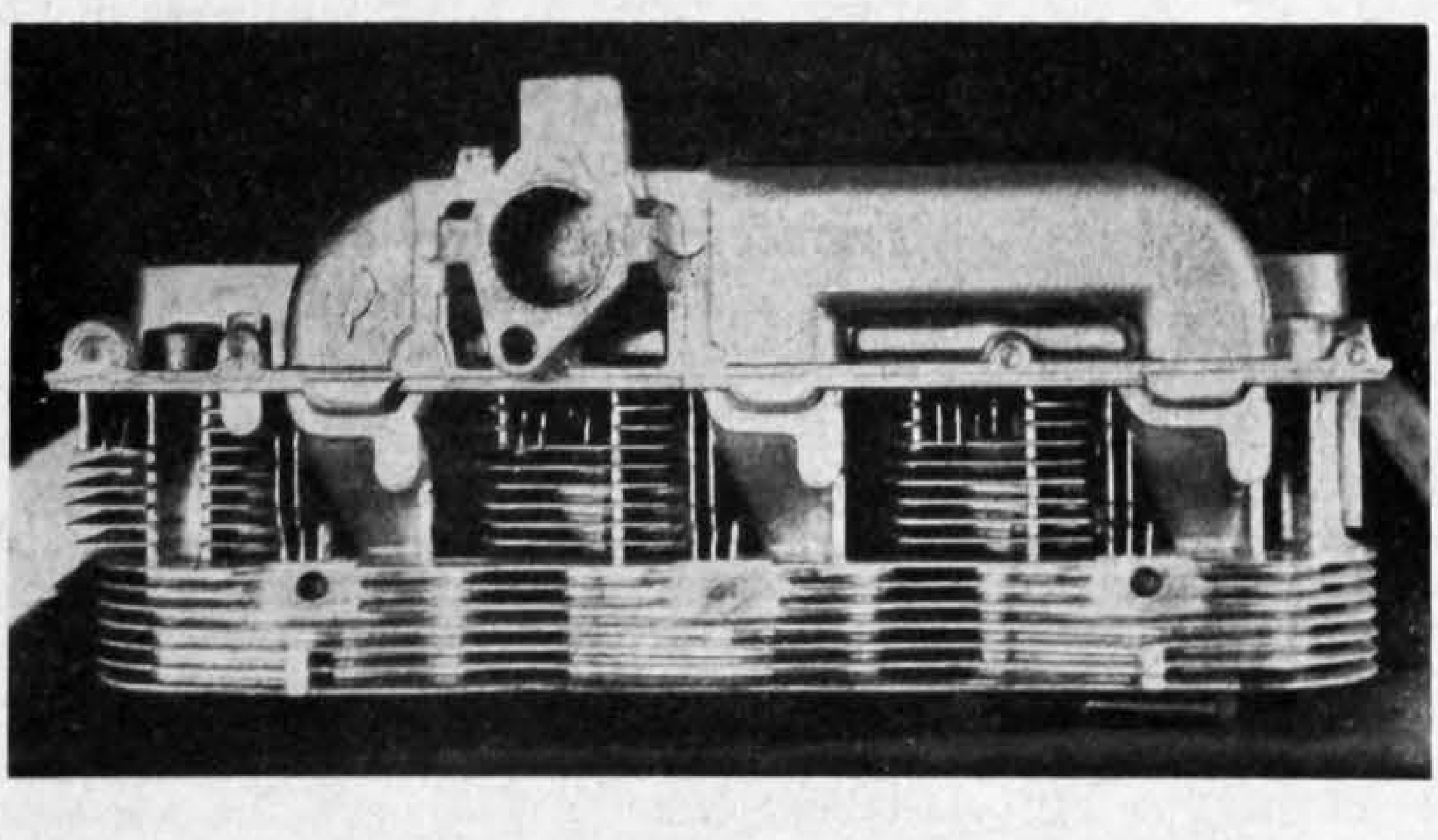


Fig. 2—Die-cast aluminium alloy cylinder head of the Chevrolet " Corvair " compact car

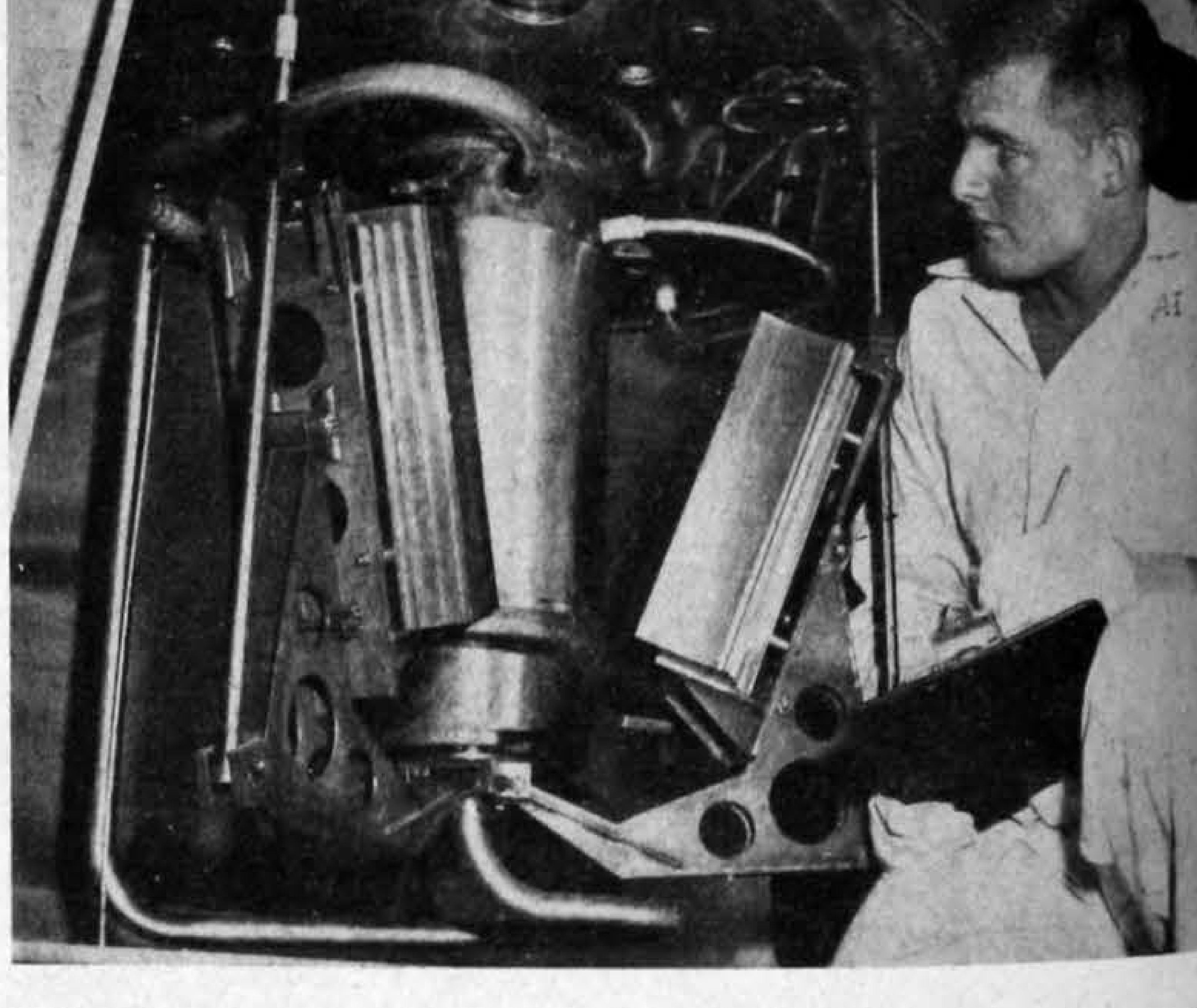
" SNAP " Experimental Nuclear Reactor

THE prototype of a light-weight, high-temperature nuclear reactor to generate heat for the production of 3kW of electric power for space vehicles has been test-operated recently at design power and temperature. The reactor is known as the SNAP Experimental Reactor, weighs approximately 220 lb without shielding and is fuelled with enriched uranium. The reactor was designed and constructed for the Atomic Energy Commission by Atomics International, a division of North American Aviation, of Canoga Park, California, as part of a programme to develop systems for nuclear auxiliary power. The reactor is situated in the Santa Susana Mountains, 25 miles from Los Angeles.

In the ultimate operational device, heat from the reactor will be transferred by a liquid sodium coolant to a boiler containing mercury. The mercury vapour will be fed into a miniature turbo-generator. Such a conversion system has been developed and successfully operated at design conditions with an electrical heat source. The components of the power conversion system were developed by Thompson Ramo Wooldridge, of Cleveland, Ohio.

The SNAP Experimental Reactor takes its name from the Commission programme under which it was developed—" Systems for Nuclear Auxiliary Power." The objective of this programme is the development of compact sources of auxiliary electric power for space vehicle systems. Two basic concepts are being followed. One concept, being developed for the Commission by the Martin Company of Baltimore, Maryland, will use the heat from a radioactive isotope to operate electrical power conversion equipment. Two devices, designated SNAP I and SNAP III, follow this concept. A " proof-of-principle " model of SNAP III has been developed by Martin. The other concept, designated SNAP II, will use the heat from a reactor to operate electrical power conversion equipment. The present experimental reactor follows this concept. The objective of the SNAP reactor programme is to provide devices which will generate many kilowatts of electrical energy for a minimum period of one year in space and which will weigh no more than a few hundred pounds. The device must be capable of withstanding the shocks and vibrations of missile launch, must be capable of unattended, reliable, and automatic operation in a space environment, and must not present a radiation hazard. Such a device would make possible long-lived weather satellites, world-wide television communications, deep-space information transmission and, eventually, interplanetary travel.

The core of the SNAP II reactor is a hexagonal array of sixty-one cylindrical elements that delivers 50kW (thermal) to a liquid sodium coolant. The fuel elements are Zr H-U^{235} and are 10in long and 1in in diameter. The sodium enters the core at 1000 deg. Fah. and leaves at 1200 deg. Fah., carrying the heat to the mercury boiler, which drives the miniature mercury-vapour turbo-generator. The net electrical output is 3kW, which gives an overall energy-conversion efficiency of 6 per cent.



SNAP II reactor test core which was successfully operated at full power in November, 1959