ed pulses are reflected without disturbance. The signals can be adjusted to interact at varying heights, and it is possible to monitor the entire region between 30 and 60 miles above sea level at the rate of one sweep each hour.

The National Science Foundation has granted \$164 000 to improve the system by increasing the power of the transmitters and decreasing the sweep time to less than 30 sec. The project is under the direction of Anthony J. Ferraro and Hai Sup Lee.

New environmental-sciences agency

The Environmental Science Services Administration, composed of the Central Radio Propagation Laboratory of the National Bureau of Standards, the Weather Bureau, and the Coast and Geodetic Survey, will come into being on October 11.

ESSA will be part of the Department of Commerce. Robert M. White will be its administrator and H. Arnold Karo its deputy administrator.

Solid-state "thermonuclear fusion"

In the search for a power-producing fusion reactor the experimental devices built have usually been at least roomsize, cost millions of dollars, and taken many years to construct and debug. Each time a new idea has been proposed it has required much time, labor, and funds actually to get such a device operating. Once the device is built, experiments are usually long and arduous, and almost invariably, one or more instabilities has put in an appearance.

Now, inexpensive fusion-device analogues no bigger than a dime can be built (see Fig. 1), and experiments performed on them take only a matter of weeks. The analogues are really semiconductor models, and the plasmas in them consist of electrons and holes instead of the electrons and ions of a gaseous plasma. Since the charge carriers in the plasma are not required to neutralize fixed ionic charges, the plasma can readily engage in gross displacements such as occur during the pinch effect. It is not clear how analogous the behaviors of the two plasma types are, but both experiment and theory are showing that solid-state plasmas, even though they are collision dominated, react to magnetic-field configurations in a way remarkably analogous to the nearly collisionless plasmas used in fusion research. Moreover many groups are investigating the solid-state plasma for its own sake. Some are also investigating the analogy.

A controlled-fusion device needs (1) a pure plasma consisting of electrons, deuterium, and tritium ions at very high temperatures (about 10^8 °K) and (2) an arrangement of magnetic fields that will stably confine the plasma long enough for significant numbers of nuclei to fuse. Over the past few years a group at Boeing Scientific Research Laboratories, headed by Betsy Ancker-Johnson, has built solid-state analogues of several different types of plasma-confinement machines: the linear z pinch, axial magnetic field, mirror machines with and without Ioffe bars (these are all open-ended machines), the stellarator, the Furth-Rosenbluth machine, and the Taylor torus (these are all closed devices).

In all the open-ended machines the basic part of the model was a single crystal of indium antimonide, shaped like a brick, 5 mm long and about half a millimeter in each of its other dimensions. A plasma is produced by injecting a current at the ends of the crystal, in pulses from 1 to 30 micro-

Fig. 1. First stage in building Furth-Rosenbluth "snake wrapped around a pole" (tuning coil around indium-antimonide crystal)