just how to go about making sure their data are used, and used correctly, in decision-making. The speakers were not always able to give satisfactory answers. More seriously, others questioned the ethics of taking a stand on issues. Many adhere to the conviction that the scientist's role is to provide raw data; that he has no business making value judgments on the basis of his results or telling others what to do with them.

The philosophical questions were not resolved at the GSA sessions. But the feeling among many was that geologists should be doing more than they are now. Says Everett: "The jobs are there to be done and they will be done without our input unless we get involved."

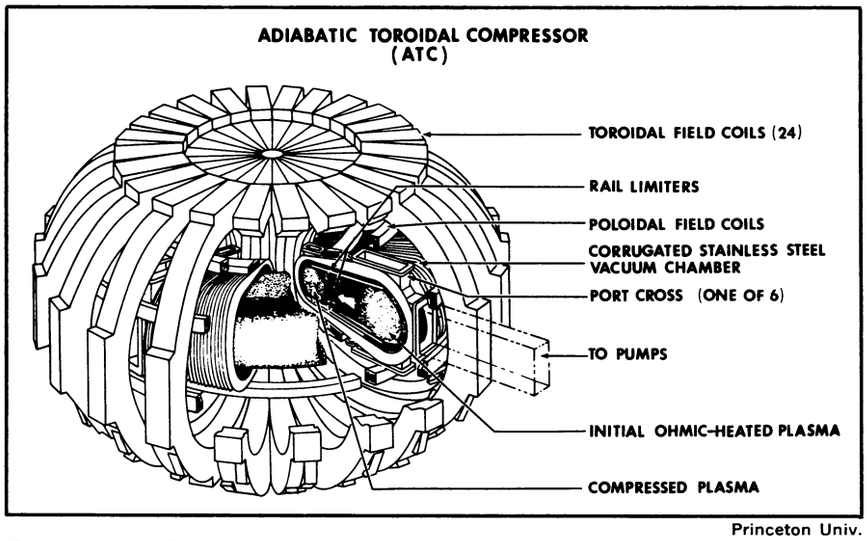
Nearing ignition point in controlled fusion

One of the two approaches toward controlled thermonuclear fusion currently under investigation is the use of magnetic fields to confine a plasma or ions and electrons for a long enough time at high enough temperature and pressure to induce enough fusions to get a useful amount of energy out. (The other method is laser-induced fusion; see SN: 6/17/72, p. 388.)

The three important criteria are thus temperature, density and confinement times. Several years ago Russian physicists invented a device called tokamak that made a great advance in confinement time. It accomplished this by running an electric current through the plasma. The current both heated the plasma and contributed importantly to the shape of the confining magnetic field.

It was widely conceded, however, that machines of the pure tokamak design would not reach temperatures necessary to ignite thermonuclear fusion. The electric current heating would not do it. But now at the Princeton University Plasma Physics Laboratory, a variation on the tokamak design has recorded significant advances in density and temperature. The device is called the Adiabatic Toroidal Compressor. It is based on the idea that compression of the plasma should increase both its density and its temperature.

The compression is accomplished by pulsed magnetic fields. Russian physicists had suggsted this, but due to the design of their tokamaks they would have had to use a high-frequency pulsation to produce many small compressions. It is easier to use low-frequency pulsations to make a large compression in one stroke. The theory of adiabatic compression was worked out by Harold P. Furth and Shoichi Yoshikawa of Princeton; the ATC experiments were done by a group headed by Robert A. Ellis Jr. The structural changes include replacement of a copper shell, which the Russians thought necessary for stability, with magnet coils, and substitution of an air-core transformer for the iron-core one the Russians used to generate the electric current in the plasma. With these things out of the way it proved possible to compress the doughnut to half its original radius in one stroke.



Princeton Univ.

Schematic of the ATC shows plasma positions before and after compression.

The cycle in the ATC begins with the plasma being heated by resistance to the current running through it. This brings the temperature of the electrons in the plasma to 10 million degrees K. Then the plasma is compressed and the electron temperature rises to 25 million degrees (100 million will be needed to achieve ignition), and the electron density goes to a hundred trillion per cubic centimeter. This makes the ATC the first tokamak device to arrive at the density range necessary for ignition. The temperature of the ions, however, remains at about 7 million degrees K. According to theory the ion temperature will catch up with the electron temperature when larger tokamaks are built. □

Anik's voice links sprawling Canada

With the successful launch of the satellite "Anik," Canada becomes the first country to have its own communications satellite system.

Anik, which means brother in Eskimo, was placed into a geostationary orbit over the equator by a Delta rocket launched from Cape Kennedy Nov. 9 by the National Aeronautics and Space Administration. NASA is reimbursed for the launch by Telesat Canada which operates the Canadian satellite communications system. A second satellite will be launched next spring.

Each satellite accommodates 12 color television programs or 11,520 one-way voice conversations. The Anik antenna is constructed so that its signals are shaped into a beam that covers only Canada.

According to Harold Rosen of the Hughes Aircraft Co., builders of the satellite, Anik makes instantaneous communications possible throughout Canada. The country's sparse population of only 22.2 million people is scattered over a land mass six percent larger than that of the United States. □

TV by satellite: UN debates curbs

The potential for direct television broadcasts from satellites to individual ground receivers around the world is a concern of many countries—especially if the broadcasting satellite is not their own. The Soviet Union's concern is mainly with the possibility of interference in what it regards as its sovereign affairs. The concern of a substantial number of other countries seems to be "cultural inundation." France, for example, seems concerned that English-language television programs would undermine use of the French language in France. Some developing countries fear direct broadcasts from major countries would undermine their national identity and retard their cultural development.

This month two world bodies—UNESCO (the United Nations Educational, Scientific and Cultural Organization) and the General Assembly of the United Nations voted to curb such use of space technology. The United States was the only dissenting vote on the U.N. resolution. (In UNESCO, however, there were several nay votes and abstentions.)

At its general conference in Paris, UNESCO adopted a declaration of "guiding principles" for direct broad-