performance of a mechanical task was to write electronically, in plus and minus charges on a magnetic drum surface, 250 Russian words and their equivalents in English. Wherever a Russian word had more than one meaning, each meaning was given a rule-sign. This set of electronic words then constituted the dictionary to which the "brain" could refer.

The second step in preparing the 701 to translate was to store the detailed instructions—exactly like those the people in Washington had followed, except that these were written in electrical charges on the faces of cathode ray tubes in the 701's electrostatic memory.

All that remained to be done after that was to give the computer the Russian words to translate. The "brain" responded at the rate of one full sentence every six or seven seconds.

The experimental demonstration can be rated only as a scientific sample, or, as Doctor Dostert neatly phrased it, "a Kitty Hawk of electronic translation." Nevertheless, the success of the project contains enormous implications for both linguistics and electronics.

Students of language are now for the first time justified in undertaking serious study of language from a mechanical point of view. They have a practical reason now for trying to find out how language actually functions.

From the viewpoint of the electronic "brain," the language translation also has tremendous significance. It has been learned, for instance, that the formulation of logic required to convert word meanings properly even in a small segment of two languages necessitates two and a half times as many instructions to the computer as are required to simulate the flight of a guided missile.

What IBM's astonishing 701 actually did, in executing the Russian-English translation, was to create within itself a working model of another "brain" specially designed to handle logic instead of mathematics. Thus, the "brain" has crowned its previous reputation for superlative versatility with an even more lofty laurel. And in so doing it has produced its own "brain" child.

Gum Turpentine May Become a Practical Source of Peroxides.—Crowning several years of research by chemists is the development at the Naval Stores Station, Department of Agriculture, Olustee, Florida, of a simple, rapid, economical process for the production of pinane hydroperoxide in good yield and good concentration from gum turpentine.

The development, which should be commercially feasible, will make pine gum, a plentiful crop, potential source of organic peroxides, suitable for use in a number of industrial processes, especially as polymerization catalysts in the production of synthetic rubber, resins, and plastics.

Terpene peroxides from gum turpentine produced by these scientists in earlier research proved to be very good polymerization catalysts in the production of "cold" rubber when tested by the Office of Rubber Reserve. But the practical method was needed to suit the development to commercial adoption.

Industry is interested. Several chemical companies have shown interest in producing pinane hydroperoxides and other turpentine peroxides. These could, in an emergency, replace cumene hydroperoxide, a benzene compound, commercial catalyst in "cold" rubber production.

G. S. Fisher, who helped develop the new, feasible process, describing it at the recent Regional Conclave of the American Chemical Society in New Orleans, Louisiana, said that 4 main steps are involved: Hydrogenation of the turpentine to give pinane; purification of the pinane, usually by simple distillation; oxidation of the pinane with molecular oxygen to a peroxide content of about 50 per cent; and stripping the oxidate under vacuum to recover the unoxidized pinane, leaving the pinane hydroperoxide as a residue. He said that starting with 8-lb. batches of turpentine, this process yielded 4-lb. batches of peroxides about 80 to 90 per cent pure.

In the basic research through which the practical development was reached, chemists prepared a pure form of pinane hydroperoxide and established its chemical structure as the *cis-l*-pinane 2-hydroperoxide.

Results of Seven-Year Truck Research Program.—After seven years of testing in a truck research project, University of Wisconsin engineers report that in many ways, the all-wheel drive vehicle is superior to either rear-wheel or front-wheel drives.

Here are some of the points the research revealed:

1. In tractive ability—the ability to get a vehicle going—the all-wheel drive is superior, followed in order by the rear-wheel, then the front-wheel drive;

2. Fuel consumption of the all-wheel drive and the two-wheel drive, either front or rear, is essentially the same;

3. Over-all tire wear on both straight trucks and truck tractors ranges from 25 to 37 per cent less on all-wheel drives.

The UW truck research project, under the direction of Prof. Archie Easton of the University College of Engineering staff, has been supported by four Wisconsin industrial firms. During its seven years, the tests have been conducted throughout the year, with special winter driving tests each year on the ice and snow of Pine Lake near Clintonville, Wis.

The project has shown that "skidding" on wet, slippery pavements is almost eliminated with four-wheel drive, and "jackknifing"—literally sure death on the highway when the truck cab suddenly goes off at a sharp angle to the truck trailer—is almost impossible with a four-wheel drive tractor under power.

"Of the three types of drive, the rear-wheel drive is most unstable when the drive wheels are over-powered," Easton says. "This is characterized by 'fishtailing'; skidding, or loss of control on both a curve and on a straight-away. Spinning the drive wheels on a front or all-wheel drive causes no 'fishtailing' or skidding on the straight-away, and no tendency to go into a flat spin or skid on a curve.

"With a moving truck tractor on a slippery surface, the rear-wheel drive unit is limited to recovery from a maximum jacknife angle of about 35 degrees, which approximates the maximum steering angle," he says.

"With front or all-wheel drive, it is possible to recover from a jackknife angle approaching 90 degees on a slippery surface," he reports. "It follows that if recovery from such high angles is possible, the tendency to go into a skid or jackknife is at a minimum with front or all-wheel drive."

Easton's research has shown that steering is about equally easy and effective for all types of drive—front, rear, or all-wheel—but he says that power delivered through the steering wheels minimizes loss of steering control by preventing the locking of the front wheels during a braking operation.

He reports that the "fanning" technique of brake application, which is effective in reducing braking distance with rear-wheel drive, is even more