

which carried two dogs and gave rise to rumors about severe medical trouble with human cosmonauts in space; and No. 122, a weather satellite whose launch was witnessed by possibly the first foreigner ever to visit the Soviet space complex at Baikonur—President de Gaulle of France.

The third French satellite, D1A, was successfully launched early in the year, and has been returning geodetic survey data from its rather sharply inclined (34 degrees) orbit.

A Russian spacecraft apparently col-

lided with Venus (or landed on it) on March 1. Whether the flight was a successful planet probe or an unsuccessful flyby was debated, but initial concern was over whether the Soviets had sterilized the vehicle (they had) so that it would not contaminate the planet with earthly bacteria.

Applications for positions in the second group of U.S. scientist-astronauts were requested by the National Aeronautics and Space Administration and are due Jan. 8, 1967.

A new rash of UFO sightings

prompted two Federal investigations, several books, and resulted in the Air Force's becoming completely fed up with carrying responsibility for the whole thing and dumping same on the University of Colorado.

On the good side, television viewers saw the first live coverage of recovery from space this year, beginning with Gemini 9. On the other hand, an accident during an unauthorized publicity photo flight cost the lives of two pilots and one of the country's two \$600 million B-70 superplanes.

ENGINEERING/TECHNOLOGY

Road to Glory?

Basic research, a miracle phrase that once could open any door, including those of government coffers, is in for a rough time.

On the other hand, unbasic science, better known as technology, has acquired a rooting section that is spreading all through the government into such keys spots as Congress, the Defense Department and the National Bureau of Standards.

Combined with plans to soup up the mind-bogglingly antiquated U.S. patent system, this new view should see the greatest surge in technology and engineering since before all the basic research noise began in 1959. Many federal agencies are already studying NASA's technology-boosting plan of offering royalty-free use of all its inventions, followed, if that fails to bring the engineers out of the woodwork, by royalty-free exclusive rights.

Not all research, of course, is directly speeded or impeded by government funding traffic. To a large extent, technology breeds technology. The huge supersonic transport project, for example, has caused the competing manufacturers to develop almost an entirely new branch of metallurgy, since there have been practically no existing techniques for fabricating the mostly-titanium aircraft.

This year in technology:

A reading machine for the blind translates writing into tactile vibrations received through the fingertips.

Patients will be less exposed to X-ray radiation because of a new machine, designed with its radiation source housed seven inches farther from the person than in present designs. The machine which also gives better pictures is the first since 1923 in which the components inside the X-ray head have been rearranged.

The use of inorganic solvents lacking light atoms such as hydrogen was the basis for a new type of liquid laser with a high energy output.

Ground glass was made into a lubricant suitable for aerospace applications and automatic weapons.

A photographic system that takes black-and-white pictures and then shows them in color was revealed.

A new microscope was developed that can either superimpose one image on top of another or rapidly alternate images.

An F-104 Starfighter capable of traveling at twice the speed of sound took off without using a runway, receiving extra thrust from a solid-fuel booster rocket mounted beneath the fuselage.

The first four-inch superconducting linear atom smasher section was successfully operated.

Troops were successfully landed on treetops from helicopters.

A computer language called FASE for "Fundamentally Analyzable Simplified English" was devised that will be useful in automatic information retrieval.

A laser powered by the sun was successfully tested.

Automated libraries capable of supplying information and selected book passages on the television screen with a simple telephone call were predicted.

A proposed system will make broadcast of television programs directly to homes from satellites possible.

The "tuning" of a tiny pin-headed integrated circuit was made possible by a new kind of transistor containing a fine gold whisker only one-tenth the diameter of human hair.

Liquid methane was proposed as a

possible fuel for supersonic transport planes.

The first electrically scanned laser system made possible tracking rockets during launch more precisely than with radar.

A test was being made of a computer-based registry for chemical compounds that would provide a comprehensive file of about 40,000 chemical substances of special interest to the Food and Drug Administration and the National Library of Medicine.

The theory that flame can be used to amplify sound was verified by the production of a system that intensifies a human voice to many times that possible with the electrodynamic loudspeaker.

A new method of desalting seawater placed in operation depends on the energy of chemical reactions for its power.

A battery-operated electric car that is plugged in for recharging while parked was seen as a future means of transportation with the development of a new type of battery that offers 15 times the energy density of current batteries of the same size.

A "telepuppet," or robot, that could take the place of man and perform chores in space while controlled by radio waves from earth was deemed possible with the instruments and technology available.

Synthetic pictures of the ground, clouds and other objects on earth were generated by a tiny computer onto a television screen.

Rings for storing accelerated protons are being built both at CERN (28 Bev) and at Academic City in Siberia (25 Bev). Finishing touches were being put on the Soviet 70 Bev atom smasher scheduled to go into operation during 1967.