particle per five cubic centimeters.

The solar wind, which is composed of ionized particles and is about five times as hot as the hydrogen, serves as a kind of shield for the sun and inner planets. It carves out an ellipsoidal cavity in the hydrogen cell.

At the boundary between the solar wind and neutral hydrogen a kind of electrical friction keeps the two distinct. Hydrogen atoms trying to pass into the solar wind are ionized, while protons passing into the hydrogen cell will pick up an electron and be neutralized.

The cavity extends about 750 million kilometers from the sun, about to the orbit of Jupiter. The estimate of the hydrogen cell's velocity was derived from this distance by calculating the speed necessary to drive the hydrogen that close to the sun against the pressure of the solar wind. If the velocity is accurate and the hydrogen cell is no more than 45 billion kilometers long, it could take the solar system another 50 years or so to pass through it.

To find out more about the cell, the discoverers are putting ultraviolet sensing equipment on the two Mariner probes scheduled to orbit Mars next year. This will bring observation 75 million kilometers closer to the hydrogen than the OGO-5 satellite did. They also hope to put equipment on the spacecraft making the grand tour of the outer planets in the late 1970's. □

ATMOSPHERIC MONITORING

Prototype for global network

A number of scientists have been pointing out recently the need for some kind of global monitoring system to determine both what effects man has on the environment and what changes are occurring naturally (SN: 10/10, p. 300). Some efforts have been made in this direction, but as yet no comprehensive long-term system has been set up.

Scientists at the National Center for Atmospheric Research in Boulder, Colo., are now developing a prototype reconnaissance station as the first step toward a worldwide network to monitor the chemical composition of the atmosphere. The National Oceanic and Atmospheric Administration and the National Air Pollution Control Administration have expressed in taking part in the project.

Some of the atmospheric constituents the NCAR scientists would like to keep an eye on are:

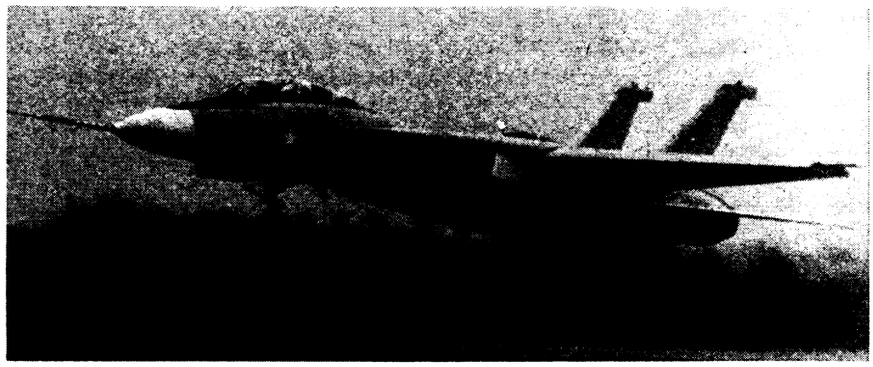
- Particles, including their concentration, size distribution and physical and chemical nature;
- Gases that play a role in producing particles, including hydrocarbons, sulfur dioxide, hydrogen sulfide, ammonia, ozone and nitrogen oxides;
- Carbon monoxide and carbon dioxide;
- Certain persistent chlorinated hydrocarbons that enter the air as insecticides or in the form of industrial pollutants;
- Turbidity, or dustiness.

Once the first station has been operated for a few months to shake out bugs, the NCAR scientists hope to install at least five or six others in such places as Alaska, Hawaii, Antarctica and the Amazon jungle. These stations would ultimately become part of a global network operated by some international group, such as the World Meteorological Organization.

Then, says Dr. Richard D. Cadle, head of NCAR's atmospheric chemistry department, "We may begin to get the answers that we need to some critically important questions about the changing chemistry of the earth's atmosphere." □

F-14

The felled bird



When the Navy's high performance fighter, the F-14, has completed its test program this year, it is expected to be more than a match for anything flying —including the Mach 3 Russian Mig 23 and the Air Force's F-111. Thus the loss of the first test airplane last week was more than a crushing blow to the Grumman Corp., the contractor. The mishap necessitates both a tedious examination into the sequence of events and failure that felled the plane and a reshuffling of the test program to accommodate the loss.

The sleek, twin-tailed jet, dubbed Tomcat, is the Navy's choice over the F-111B—the ill-fated Navy version of the controversial TFX that turned out to be too heavy for carrier flights. Wing sweep can automatically be varied from 20 to 68 degrees. Its maximum speed will be in excess of Mach 2.

Tomcat 1, the first F-14 produced, was on its first real test flight Dec. 30, after a successful 10-minute run Dec. 21. The test flight was scheduled for 90 minutes. But after about 30 minutes the pilots reported the first sign of trouble—a power transient. What actually happened to the $11 million bird is not yet known. But from preliminary accounts, all three hydraulic systems failed.

The pilots used a secondary reserve system of pressurized nitrogen gas to lower the landing gear. They were on the glide approach path for landing when the plane began oscillating vertically out of control. The pilots ejected safely from 300 feet about a mile short of the runway.

Each of the aircraft's three hydraulic systems operates with a different power source, but they are interchangeable at points. The primary system, for operating such things as accessories, the refueling probe and the flaps, is backed up by a secondary or flight-control system, which is used mainly for the rudders and elevators. The third system, a back-up flight-control system, should have been able to hold the plane on its approach glide path. The fact that it too failed indicates a malfunction at a common point in all three systems, such as a leak of hydraulic fluid.

The plane was the first of 12 test planes to be delivered to the Navy—one each month. The Navy recently contracted for the production of 26 planes to be delivered in 1972. The total contract is for research and development and an option for 469 aircraft, at a cost, including R&D, of about $13.5 million each.

Each of the 12 test planes is configured to test different performance capabilities. Ironically, the lost plane, delivered a month ahead of schedule, was to test some 500 points on the flight-control system. The remaining 11 were to test such data as engine performance, low-speed flight characteristics and the plane's Phoenix missile system. One of the 11 will now have to be reconfigured to accommodate the features that were lost on the first plane. □

Science Service, Inc. is collaborating with JSTOR to digitize, preserve, and extend access to *Science News*. www.jstor.org