t Langley Research Center

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wind and these precisely engineered models tell researchers what shape holds the most promise for full-scale flight efficiency, performance or safety – usually at a fraction of what it would cost to find out any other way.

Transonic Dynamics Tunnel

One Langley wind tunnel has been made "heavier" so it can properly test models of lighter and lighter aircraft. It is heavier in the sense that when it started up again last summer for the first time in nearly a year, 50 percent more gas could be pumped into the circuit. This extra density makes an aircraft model feel like it's flying through thicker, heavier air. This makes it easier for researchers to accurately simulate the interaction of models to the aerodynamic forces of rushing wind.

The giant electric motor that powers the Transonic Dynamics Tunnel has been rewound and improved so that its fan blades still move the wind at sound barrier speeds – even with this extra- dense load to push around. The gas used as a test medium in this continuous flow tunnel is Freon, already four times denser than air. Drive power has been boosted from 20,000 to 30,000 horsepower, and the tunnel cooling, control and power distribution systems have been upgraded to take the extra power.

"From a practical standpoint," says Robert V. Doggett, Jr., "What this means is that now time and money can be saved in making scale

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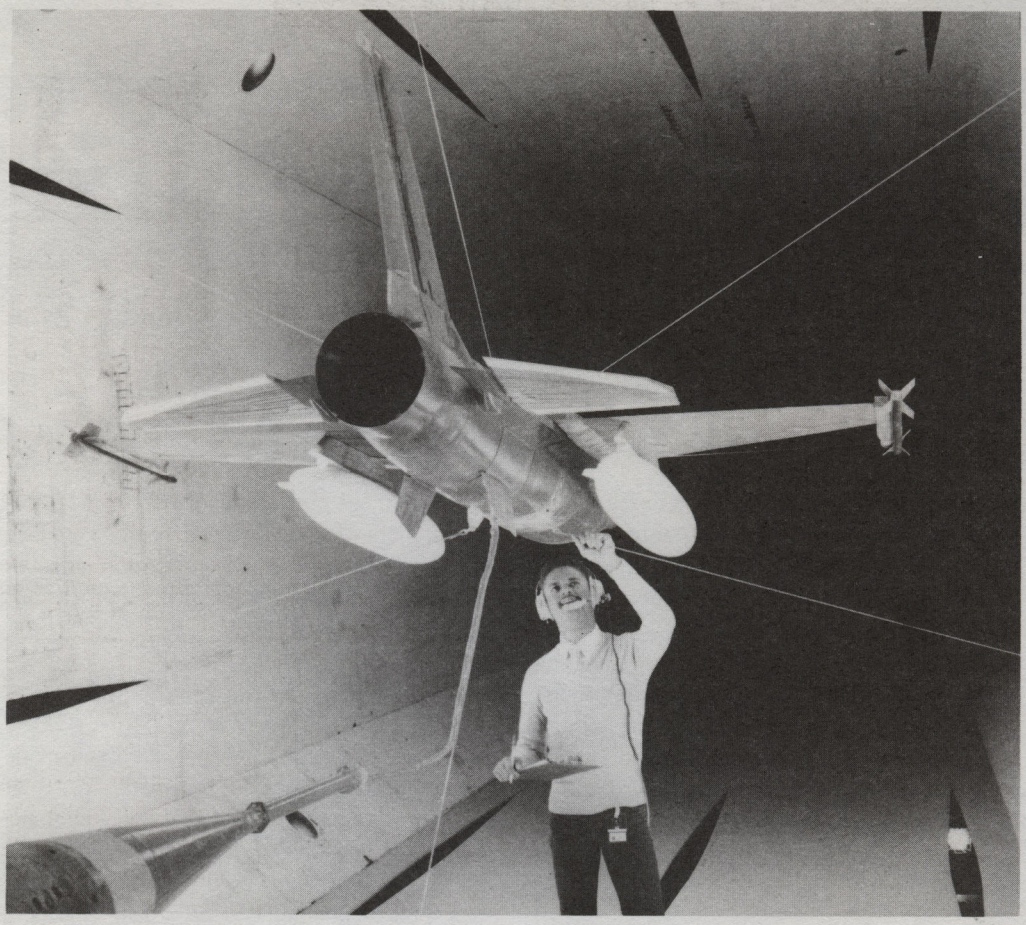
LRC to Honor Inventors

The Langley Research Center will hold its annual Patent and Technology Utilization Awards Luncheon Tuesday, April 29, at The Ship's Wheel in Poquoson at 11:30 a.m.

Guest speaker for the occasion will be Anne K. St. Clair, Materials Division.



Jerry Ward inspects the cable support system for an F- 16 wind tunnel model in Langley's Transonic Dynamics Tunnel. Modernization of the tunnel will allow even better simulations for the next generation of advanced fighters.

Continued from page 1.

aircraft models for tests in the tunnel. Before, with the trend in aircraft design toward lighter and lighter aircraft for more and more structural efficiency, our model builders had to make some models so lightweight that they were difficult to make and easily damaged. The ratio of airplane flight density to model test density is a very important factor for 'aeroelastic' tests like we conduct in the Transonic Dynamics Tunnel."

"Now, with a 'heavier' test medium, our model makers will be making slightly heavier models. This means less balsa wood and styrofoam and more metal. In addition to substantial cost savings, some aircraft models which previously could not be accurately scaled for this tunnel can now be made for the first time."

As an aircraft flies through the air, its wings and tail vibrate at certain frequencies, a harmless combination of structural response to aerodynamic pressures. Most every aircraft is susceptible – at certain speeds – to a potentially harmful interplay of those wing vibrations and aerodynamic forces called flutter. In the most severe cases, unchecked flutter can damage or destroy a wing. Wind tunnel tests can identify a potential flutter problem, and adjustments can be made to the airplane so it is perfectly safe to fly.

The Transonic Dynamics Tunnel is dedicated to aeroelasticity studies and tests and has special features which make it a national resource for flutter and buffet tests.

Its increased density capability is needed chiefly to assure that new designs of high-speed aircraft and space vehicles are flutter free. Work will continue in rotorcraft and active controls research, in ground-wind loads tests of advanced space launch vehicles, and for confirmation of unsteady transonic flow theory. Because of its capabilities and special features, the tunnel usually has a two-year backlog of work. Among the first tests to take advantage of the tunnel's increased capability is flutter clearance of a Gulfstream II with an experimental advanced turboprop engine mounted on one wing. These sub-scale tests will help clear the way for NASA-sponsored flight tests this year.

The Transonic Dynamics Tunnel modifications cost approximately $8.