

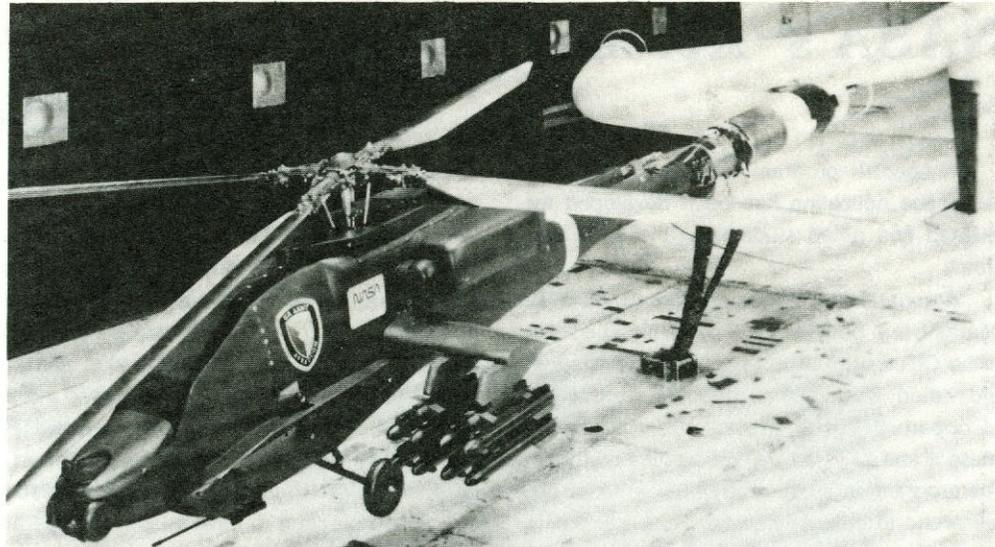
4- by 7-Meter Tunnel-1212C

Another Langley wind tunnel has been extensively modified to increase tunnel productivity and improve flow quality. The 4- by 7-Meter Tunnel was constructed in 1970 for the study of vertical and short take-off-and-landing aircraft. "V/STOL" aircraft have unique flying characteristics; they also have unique aerodynamic problems. Helicopters, vertical take-off-and-landing jet fighters, and airplanes intended for short runways have all benefitted from the tunnel's model testing.

The 4- by 7-Meter Tunnel has a moving ground plane along the floor of the test section to better simulate flight conditions for takeoff and landing. It also has a removable side wall and ceiling in the test section, allowing a wide range of tests, and a test section size that permits use of large powered models. The tunnel's name, 4- by 7-Meter, defines the test section height and width of 13 by 23 feet. The tunnel has proven its versatility in tests of conventional aircraft as well partly as a result of these features.

The tunnel is increasingly in demand for subsonic aerodynamic research, so productivity is being increased by reducing model changeover time. Improvements to the tunnel's model preparation area allows parallel preparation of several models, instrumentation calibration and data acquisition checkout before model installation in the test section. Modifications included fabrication of additional model support carts with improved design features, expansion of the model preparation area and new pre-test facilities: a laser velocimeter laboratory and a rotor test cell located near the tunnel test section.

Flow quality - important to accurately simulate a free stream of air - has been improved by a series of seemingly simple changes within the tunnel shell. Flaps have been added to the trailing edge of directional vanes to help the air turn a critical corner without separating into multiple flows; a new and expanded system



Refinements to the 4- by 7-Meter Tunnel will allow models like this one-quarter scale helicopter to be checked and readied for test before installation in the tunnel, increasing productivity by an estimated 50 percent.

of screens and other special-purpose filters is expected to dramatically reduce flow turbulence, as is a redesign of part of the test section.

Old thermal insulation in the test section has been replaced with dual-purpose acoustic insulation to improve noise measurements of rotor and advanced turboprop systems.

When the "new" 4- by 7-Meter Tunnel resumed operation in late 1985, the first research program to benefit from its several refinements was an aerodynamic and acoustic study of helicopter main and tail rotor interactions, followed by low-speed tests of the F-18 fighter.

The 4- by 7-Meter Tunnel work totals about \$7.2 million.