

Lockheed

AERONAUTICAL RESEARCH

Sharing the blackbird

A would-be military interceptor is being turned instead to research by the Air Force and NASA

by Jonathan Eberhart

In a decade of flight that began in 1959, the X-15 rocketplane reached heights and speeds unmatched by any other aircraft, investigating aeronautical developments from heat-resistant paint to experimental engines. Most of its researches were conducted jointly by the Air Force and the National Aeronautics and Space Administration, although in the last 10 months before tight budgets grounded the plane (SN: 2/8/69, p. 144) it was under sole NASA sponsorship.

The other interagency research superplane was the XB-70, which acquired the "X" in its name (for experimental) and NASA as a co-sponsor only after the Air Force had discovered the craft to be far too expensive to buy in quantity as a bomber. Even as a research vehicle, however, it proved costly enough that a year ago it too succumbed to financial flak.

Now there is a third flight research effort joining the two agencies, which both parties hope to carry on for five years.

This time the flying testbed is the YF-12A, a twin-engined jet fighter produced for the Air Force in what may be

the most secret aircraft development facility in the country, Clarence "Kelly" Johnson's "skunk works" at the Lockheed-California Co. in Burbank. Unofficially known as the blackbird, the YF-12A is neither as fast and high-climbing as the X-15 nor as big and powerful as the XB-70. A top speed of more than 2,000 miles per hour and a ceiling of almost 20 miles, however, make it one of the hottest performers currently in the sky.

The blackbird got its research job, as did the XB-70, by default. Originally conceived as an advanced interceptor—it can fly rings around the Air Force's best operational interceptor, the F-106—it was subsequently deemed by Congress to be too expensive for such a mission. Faith in the plane's capabilities was affirmed, however, when the purse-string-handlers allowed the Air Force to buy two full wings, comprising several dozen aircraft, of a reconnaissance version called SR-71.

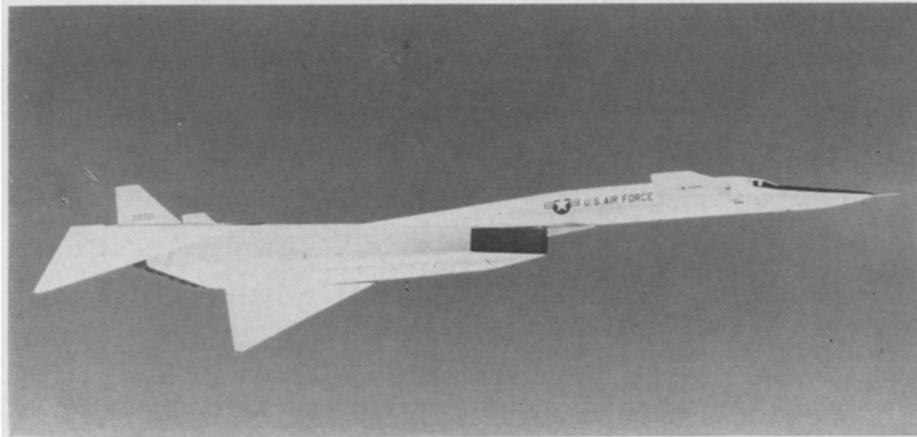
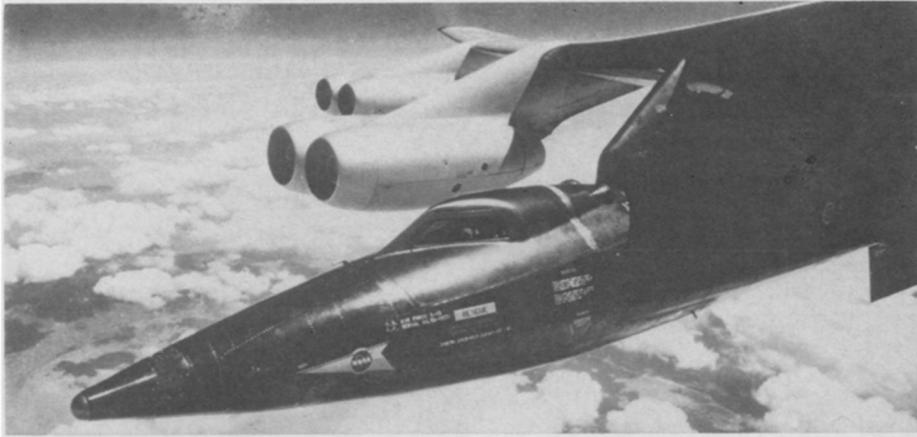
Only two of the interceptor versions were built, and both had been languishing in so-called flyable storage at Edwards Air Force Base in California, though the Air Force still nurtures dim

hopes of getting more some day. Then, last summer, the joint research arrangement was proposed, and the two erstwhile dust-collectors seemed like naturals.

Rescued from having to let the expensive blackbirds die of senescence, the Air Force readily agreed to provide both planes, along with spare parts, ground equipment and base support. NASA, with a growing interest in aeronautical research, is thereby getting off lightly in funding the actual research, even though it is footing the bill for both agencies. The space agency estimates that \$10 million should take it all the way through fiscal 1974, compared to about \$6 million a year for the X-15 with the plane's costs included.

The program is in two phases, with the Air Force doing research through the end of 1971 and NASA taking over in the summer of 1972. The first Phase 1 flight took place on Dec. 11; a second came in the middle of January.

The Air Force has two main goals in its share of the project: to explore the full capabilities of the aircraft itself in a variety of studies, and to use it as a simulated enemy interceptor in developing bomber penetration tactics. Here, in a way, the YF-12A has an advantage over the X-15, whose performance was so far removed from any presently known manned weapon sys-



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The X-15 was faster, the XB-70 bigger. Both were downed by austerity.

tem as to reduce its value in simulating the opposition. The blackbird, by comparison, is a likely barometer of the next generation of operational interceptors, even though officers who have worked with it have described it as "a quantum jump ahead" of present ones.

One of the plane's main Air Force research tasks will be to help work out the procedures and limitations of command and control in high-performance aircraft doing military missions. The X-15 pilots did not have to consider opposition from the enemy. YF-12A pilots may have to. Asks Maj. Marvin Roupe of the Air Force Weapons Branch: "Will the thing be so fast that we'll have to remove the pilot and automate it?"

Other concerns will include anticipating general operational problems for military aircraft to come. Computer programs, for example, both in the air and in support equipment on the ground, are likely to need considerable modification to get the most out of the plane's talents in interception.

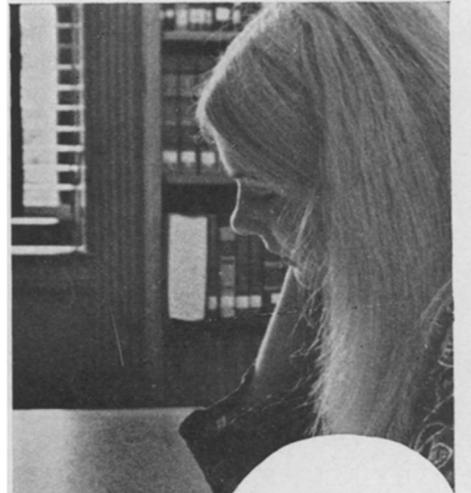
Once the space agency gets into the act, it will be seeking information largely of general aeronautical value, which could benefit the Air Force as well as NASA. The effects of engine inlet design on interactions between the airframe and propulsion system, which the agency is also studying through

private contractors, will be a major item on the agenda.

Plans also include investigations of heat transfer under high-speed conditions and of noise produced in the boundary layer, the part of the air flow closest to the plane's surfaces.

A particularly important part of the schedule will be a range of studies affecting flight management and air traffic control. The ability of a plane to maintain a precise altitude at supersonic speeds will be a vital piece of knowledge if the commercial airlines of the future are ever to become even a fraction as crowded with supersonic jetliners as they are today with subsonic craft. The interactions between the pilot, flight control system, cockpit instruments, ground displays and air traffic controllers are already major problems; they are on the blackbirds' list.

A broad effort is planned involving development of electronic instrumentation. The use of satellites for navigation and traffic control will be evaluated, particularly in their accuracy at providing position information to the pilot and to the ground. More specialized projects will include a study of the effects of the high-speed environment on antennas and receivers for L-band low-frequency radar, as well as one of multipath signal scattering. □



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