

'Lead Time' To Make Airplanes Hinges on Timeliness of Decisions

Seven Years Used To Bring F102 Into Air

By ROBERT S. BIRD and TOM LAMBERT
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Washington—The making of modern warplanes, more than any other industry in existence today, is a business of making decisions—countless thousands of them.

All the basic and most of the other critical decisions about warplanes—speed, altitude, range—are made in the Pentagon and by the Air Force; the manufacturer is bound by them. All his decisions on manufacturing details, which also are made, must be approved by the official agencies.

This, the "lead time" to make a warplane from first study to completion of the first production model, hinges to a very great extent on the quality and timeliness—especially the timeliness—of official decisions.

These set the pace for each phase of the design, development and production of the airplane, and they speed or retard the whole flow of detailed manufacturing operations.

No Count of Decisions

There is no count of the hundreds of decisions made over a seven-year lead time period to bring into production this year this country's newest and finest supersonic, all-weather fighter-interceptor, the F102.

This big, delta-wing jet fighter which can hit up to 1,000 miles an hour and can streak to altitudes over 60,000 feet was a long time emerging, and the Air Force chiefs breathed easier this summer when it finally began moving into squadrons.

Until the F102 materialized, this country's fighters had trouble climbing to or fighting at the altitude of 50,000 feet credited to the Soviet's high-flying, intercontinental jet bomber, the Bison.

The latest-known Russian all-weather fighter interceptor, the Flashlight, is inferior in performance to the F102. The Flashlight is not believed to be supersonic or to be able to fly as high as this country's B52 or B47 bombers, although it probably can match their speed.

But though it took seven years to bring the F102 into operation, it still is not the plane which the Air Force in 1949 had hoped to have by 1954.

Dream Plane in 1959

The F102 is an "interim"

plane. The 1949 dream plane scheduled for use in 1954 may not be operational until 1959 at the earliest. The 1949 dream (the F106), instead of taking to the air two years ago may fly only in prototype model later this year.

It is the history of the "interim" F102 that will be examined here in the framework of two major reasons outlined by aircraft producers and some top Pentagon officials to explain this country's perilously long lead time in making warplanes to meet the Soviet air threat. Those reasons are:

1. It takes the Pentagon and Air Force too long to make up their minds on what kind of combat planes they want. And when they finally do reach a head decision they continue to slow action by engulfing manufacturers in red tape and excessive paper work.

2. New-type warplanes are so complex and precise that it takes longer to build them. (This problem doesn't seem to bother the Russian military brass too much.) Manufacturers admit they make mistakes building planes beyond the frontiers of technology, lose time correcting errors. But official indecision and red tape, they say, only lengthens already-lengthening lead time.

In the F102, both of these reasons contributed to stretching out lead time. This was dangerous, because in the same period the Soviets were making the Bison, a high-flying jet bomber which can carry the hydrogen bomb to this country.

The F102's supersonic delta wing (a nearly perfect triangle with the base toward the tail and the apex near the needle nose) was foreshadowed in studies going back to 1930, in German reports captured in World War II and in government wind tunnel and laboratory tests in 1947.

Research Plane Built

Also, preceding the first formal studies for the F102 proper, an experimental delta wing research plane was built from which, in an aerodynamic sense, the F102 was largely derived.

For the sake of convenience, this research plane and the F102 are considered in arbitrarily-selected time spans. Both the research plane and the F102 were projects assigned to Consolidated Vultee Aircraft Corp., which in 1952 became the Convair division of General Dynamics Corp.

First Time Span (56 months): In April, 1946, the (then) Army

Air Force asked Convair to design a high-speed interceptor with a delta wing. It was to be used for aerodynamic studies and would not include weapons. Designated the XF92, the research plane was built and made its first flight on Sept. 18, 1946. Extensive test information was studied by the Air Force and other agencies through 1950 when a decision was made to go ahead with the new airplane that became the present F102.

Second Time Span (15 months)—The Air Force invited aircraft companies to submit designs for the new plane and in January, 1951, several manufacturers entered their suggestions.

Some aircraft company executives, including Gen. Joseph T. McNamery (U.S.A.F. Ret.) president of Convair, feel that such design competitions are one of the unnecessary time-consuming procedures in getting out urgently-needed combat planes.

Would Save Time

Nobody knows better than the Air Force the capabilities and responsibility of each major aircraft manufacturer, they assert, and the Air Force would save time and move aircraft programs faster if it would give a project to an aircraft maker of its own selection and let him go ahead. Or at least, they say, limit the competition to the manufacturers best qualified for the particular project in mind.

Aircraft makers also point out that Air Force design competitions which formerly cost about \$25,000 now cost up to \$500,000—a heavy penalty for a loser to bear.

In this case, the Air Force—seven months later—authorized Convair to start design on the airplane. And here again lead time is lengthened. Numerous boards, committees, report groups and individuals scrutinized each step of the F102 program under the Pentagon "system" for such procedure, a process which leads to delay because it is so difficult to obtain unanimity of view from all the participants.

Fifteen months elapsed before authorization came in March, 1952, to build an F102 prototype.

Third Time Span (33 months):—The Air Force had developed a logical, new concept for this plane. It was to be a "weapons system," in which the supersonic airframe, jet engine and almost the entire automatic assembly of radar, fire-control apparatus and missiles were "married" to each other from the very start of the design.

The Hughes Airplane Co. was to make the electronics system and the six-foot-long Falcon guided missiles for the F102. Pratt & Whitney was to provide the J57 jet engine with about 10,000 pounds thrust. Convair, as prime contractor and airframe manufacturer, was to see that all these elements meshed together as precisely as possible.

'Densest' Plane Ever Built

Up to this time, no combat plane had been so designed from the beginning. One result was that the F102 ended up as the "densest" plane ever built, the most tightly packed for its size of any aircraft. The "fit" of the components is literally "skin tight"—with the thickness of the airframe's aluminum hide held in many places to five or ten one-thousandths of an inch.

Another recent Air Force con-

cept also entered the picture here. Under former programs, only a couple of prototype planes were ordered, then flight-tested extensively, perhaps for two years, before production was speeded up. That method, of course, greatly stretched out lead time. On the F102, the Air Force tried the so-called Cook-Craigie plan—ordering a larger number of early models on which more testing could be done more quickly.

This called for earlier tooling in the aircraft plant, highly desirable from a lead time viewpoint but not without risk that the plane to be made may turn out to be a failure. The Soviets take this risk in their effort to surpass this country in advanced-type planes.

It turned out in the case of the F102 that the first 14 production planes were, in fact,

"dogs." They failed to meet one of the F102 requirements, as will be seen.

The F102 production contract came in August, 1952. Within a few months, while the prototype was being hastened to completion, production tooling and production was started on planes scheduled for operational service.

In October, 1953, the F102 prototype took to the air. It would not go through the sonic barrier as it was supposed to do.

This was a tremendous setback to the engineers, to Convair, to the Air Force. Convair says it had miscalculated the performance of the jet engine which was to have pushed the plane beyond the speed of sound—the point at which air streams and shock waves cause erratic behavior which was imperfectly understood then and not fully understood now.

Problems Under Study

But the problems of supersonic flight were under intensive study and in 1952 the government's National Advisory Committee for Aeronautics had made a tremendously important technological discovery. Through wind tunnel and other tests, a mathematical formula known as the "area rule" gave engineers new knowledge of how to fashion supersonic shapes.

The F102 was redesigned, with the "area rule" which pinches the fuselage waist in "Coke bottle" style. Certain that this new shape would solve the F102's troubles, Convair in April, 1954, started up a new production line. By December, the new model F102 was zooming past the sound barrier even on the climb. Production rates and numbers of F102's in squadrons are secret but it is estimated we have over 200 of them and are turning out more than 10 weekly.

The F102 was late in arriving in combat units for—as the reader has seen—several different reasons: Pentagon and Air Force sluggishness in decisions, a major technological mystery, manufacturing mistakes and difficulties. Competent authorities undoubtedly will argue over how to assess the blame for this tardiness.

But the cold fact is, after seven years lead time the F102 squeaked into operational use only this year, perhaps just in the nick of time—considering, that is, the surprise appearance in the air two years ago of the Soviet intercontinental jet carrier of the hydrogen bombs, their Bisons.

Tomorrow: "Dream plane" survives Pentagon indecision.

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A Nichol's Worth of . . . Comment On This and That

By HARMAN W. NICHOLS
United Press Feature Writer

Washington—UP—The ladies in my house love Mamie.

So they thought they would try out the formula Mrs. Ike calls million dollar fudge. "I was an unwilling witness."

The first lady of our house first saw the recipe for the brown goodie in the National Women's Press Club cook book. That fine little periodical ran a dizzy game from apple pan dowdy to Mississippi river catfish.

So my first lady and her assistant, our 17-year-old relative, ran around the neighborhood stores gathering the wherewithal. Some of the stuff they had. Some they didn't—the German sweet chocolate, for one, and we were out of nutmeats.

Veronica, the first lady, figured that if Mamie could sweeten the future for Ike with a pan full of fudge 40 years ago when he was a shavetail, maybe she could make me sit up and fly right. Bev, the 17-year-old, agreed. So the two gals went to work, despite my advice to abandon the project.

The recipe went something like this, with arguments all along the line between Mom and daughter:

First, 4½ cups of sugar. "Isn't that an awful lot of sugar?" Bev said. "If Mamie likes that much sugar," Mom said, "we'd better go along. Want us to get thrown out of the party?" So 4½ cups of sugar went into the bowl. A pinch of salt. Then two tablespoons of butter.

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