SCAR PROGRAM OVERVIEW

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INTRODUCTION

In 1971, after some 10 years of effort, the United States Government canceled this Nation's program to develop a supersonic transport aircraft. Soon after program cancellation, however, the Government took some limited steps to keep its options open for possible future consideration of such an aircraft. First, during 1971 and 1972, the Government provided funding support for the continuation, completion, and reporting of some basic tests on materials, noise, sealants, etc. which were in progress at the close of the SST program. Then, in July of 1972, the Government initiated, within NASA, an Advanced Supersonic Technology (AST) Program. This Program, which became the NASA Supersonic Cruise Aircraft Research (SCAR) Program in 1973, was established to promote further basic supersonic research, and to provide an advanced technology base for application to possible future supersonic aircraft.

During its first 4 years of operation, the NASA AST/SCAR Program has involved the research efforts of 60 research organizations throughout the Country and has provided research data for some 300 technical reports. The Program has also made substantial progress in the identification of research solutions to the critical problems which inhibit the full acceptability of supersonic cruise flight.

The purpose of this Overview is to consider briefly the objectives, research elements, and distribution of research effort within the NASA AST/SCAR Program. Subsequent papers (papers 1 to 47) will provide details of some of the SCAR research efforts and point out the potential impact of the SCAR research results on the performance of future supersonic cruise aircraft.

DISCUSSION

SCAR Program Objectives

Among the principal factors which led to the 1971 cancellation of the United States SST Program were

1. Concerns over the marginal SST performance and economic potentials that appeared possible within the then-available technology base

2. Concerns over the possible noise and pollution impacts of SST type aircraft

In order for the United States Government or industry to make rational decisions in the consideration of future supersonic aircraft, it is necessary to know whether acceptable research solutions can be found to these technical concerns. This, then, is the principal objective of the NASA SCAR Program:

To provide the data needed to make rational decisions in the consideration of future military and civil supersonic aircraft

These data will be provided through the generation of an expanded supersonic technology base and the necessary research required to assess and minimize environmental impact.

SCAR Program Elements

All the configurational and operational features of a supersonic cruise aircraft directly influence the aircraft performance and contribute to its environmental impact. Consequently, to meet the SCAR Program objectives, a research plan was adopted which involves the simultaneous upgrading of the state of the art in all disciplinary research areas associated with supersonic flight. This approach leads to the SCAR Program elements illustrated in the left side of figure 1. Focused research efforts are carried out in the disciplinary areas of Aerodynamics, Controls, Propulsion, Stratospheric Emissions, and Structures and Materials. In each of these research areas, improved solutions to known supersonic problems are sought through in-house NASA research, NASA/Industry contracts, and NASA grants. Some examples of these disciplinary research efforts and results will be presented in subsequent papers (papers 1 to 38).

There are complex interdisciplinary relationships in the evolution of a supersonic cruise aircraft. Consequently, a disciplinary breakthrough or technology advance does not necessarily apply fully in a practical supersonic aircraft design. The SCAR Program has adopted the Systems Integration Studies approach, illustrated in the center of figure 1, to sort out these complex interdisciplinary relationships and assess the traded impact of the disciplinary technology advances. As illustrated in the figure, disciplinary research results are fed into Systems Integration Study teams which consider the impact of the research results on a baseline supersonic cruise aircraft concept. Currently, industry Systems Integration Study teams at Boeing, Douglas, and Lockheed, and a NASA/Vought in-house team are performing these integration/technology impact studies with the support of propulsion teams at Pratt & Whitney and General Electric. Some results of these studies will be presented in papers 39 to 47.

As illustrated in the right side of figure 1, the ultimate goal of the SCAR Disciplinary Research and Systems Integration Studies is to introduce into the development base an advanced supersonic technology which could lead to a supersonic cruise aircraft which is acceptable in every respect.

SCAR Distribution of Research Effort

Since the NASA AST/SCAR Program was initiated in 1972, approximately $34 million of basic research and technology funding has been provided by the U.S. Congress to carry out the supersonic research program. The distribution of this funding among the SCAR Disciplinary Research areas and SCAR Systems Integration Studies is illustrated in figure 2. The numbers in parentheses represent cumulative values since the start of the AST/SCAR Program. A continuous program has been manintained in all areas except Emissions. This latter element of disciplinary research was made the responsibility of the NASA Office of Space Sciences in Fiscal Year 1976.

CONCLUDING REMARKS

This Overview has discussed the objectives, Program elements, and distribution of research effort in the NASA AST/SCAR Program since its inception in July of 1972. The remainder of this document will provide examples of the research effort and results of the first 4 years of the Program.

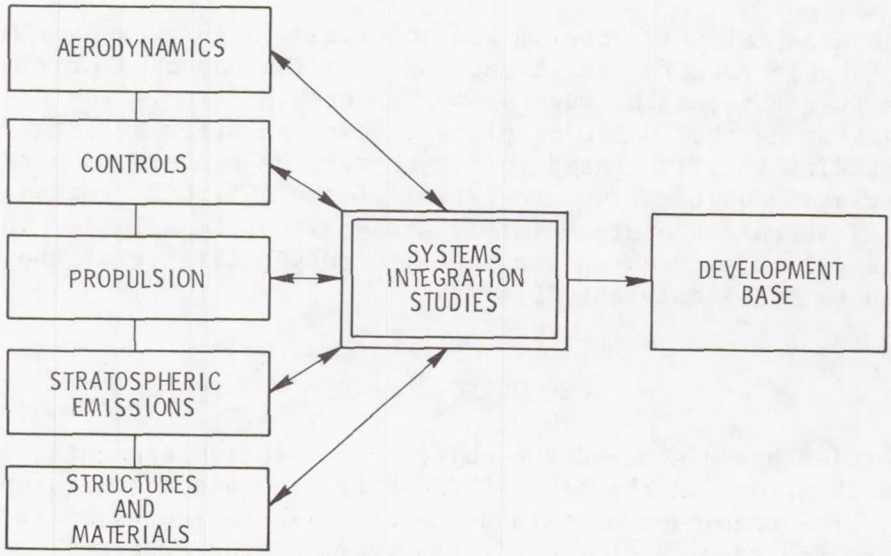

Figure 1.- SCAR Program elements.

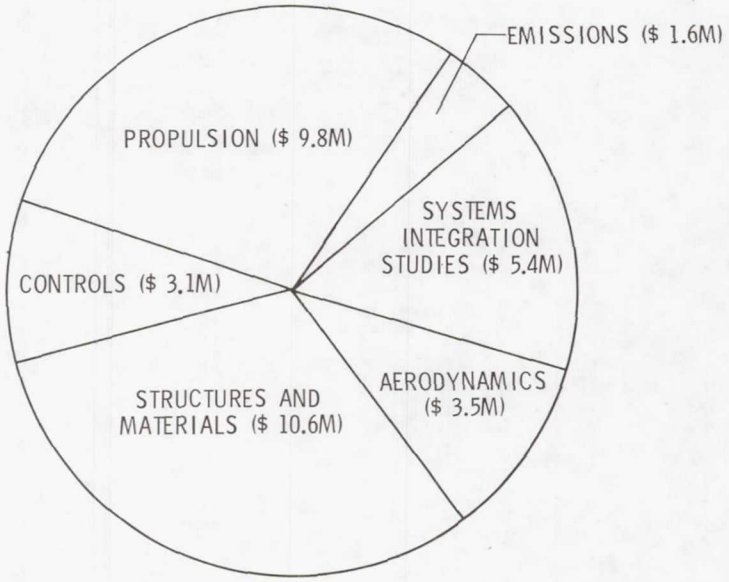

Figure 2.- Distribution of SCAR R&T effort.
(Total R&T funding to date $34.0M.)