RESEARCH ON SUPersonic TRANSPORTS AT TRANSONIC SPEEDS

Operational analyses have indicated that, purely from the viewpoint of operating efficiency, a supersonic transport should accelerate rapidly to supersonic speeds and carry out most of its climb to cruise altitude at the supersonic speeds. However, such a flight path would cause a completely unacceptable supersonic boom at the ground. To overcome this problem, the supersonic transport must climb to a relatively high altitude at subsonic speeds before accelerating to supersonic speeds. With the airplane flying at higher altitudes, the noise produced at the ground is greatly reduced. With such a flight plan a significant part of the fuel required for the flight is consumed, while the aircraft flies at supersonic speeds and the efficiency of the airplane at these speeds, as well as at supersonic speeds, must be relatively high to obtain the desired over-all flight efficiency. Further, to allow the aircraft to accelerate through the speed of sound at the higher altitudes with a reasonable amount of installed engine thrust, the transonic drag must be reasonably low.

The research carried out in the past for military-type configurations has provided a significant background of information which can be utilized in the improvement of the subsonic and transonic characteristics of the supersonic transport. The L/D at subsonic speeds can be improved through the use of fixed or variable geometry camber for which significant information is available. The transonic drag rise may be controlled through the proper considerations of the longitudinal area developments for the configuration.

While considerable background information is available, the supersonic transport configurations will differ so markedly from the configurations
previously investigated at transonic speeds that it is obvious that substantial development work will be required to obtain the best possible transonic characteristics for these supersonic configurations. In particular, the effects of variable geometry features such as variable wing sweep for these supersonic transports must be evaluated in the transonic range. Not only the performance, but also the stability and control characteristics for the configurations, must be made satisfactory at these speeds.

KWW:mbb

9-1-60