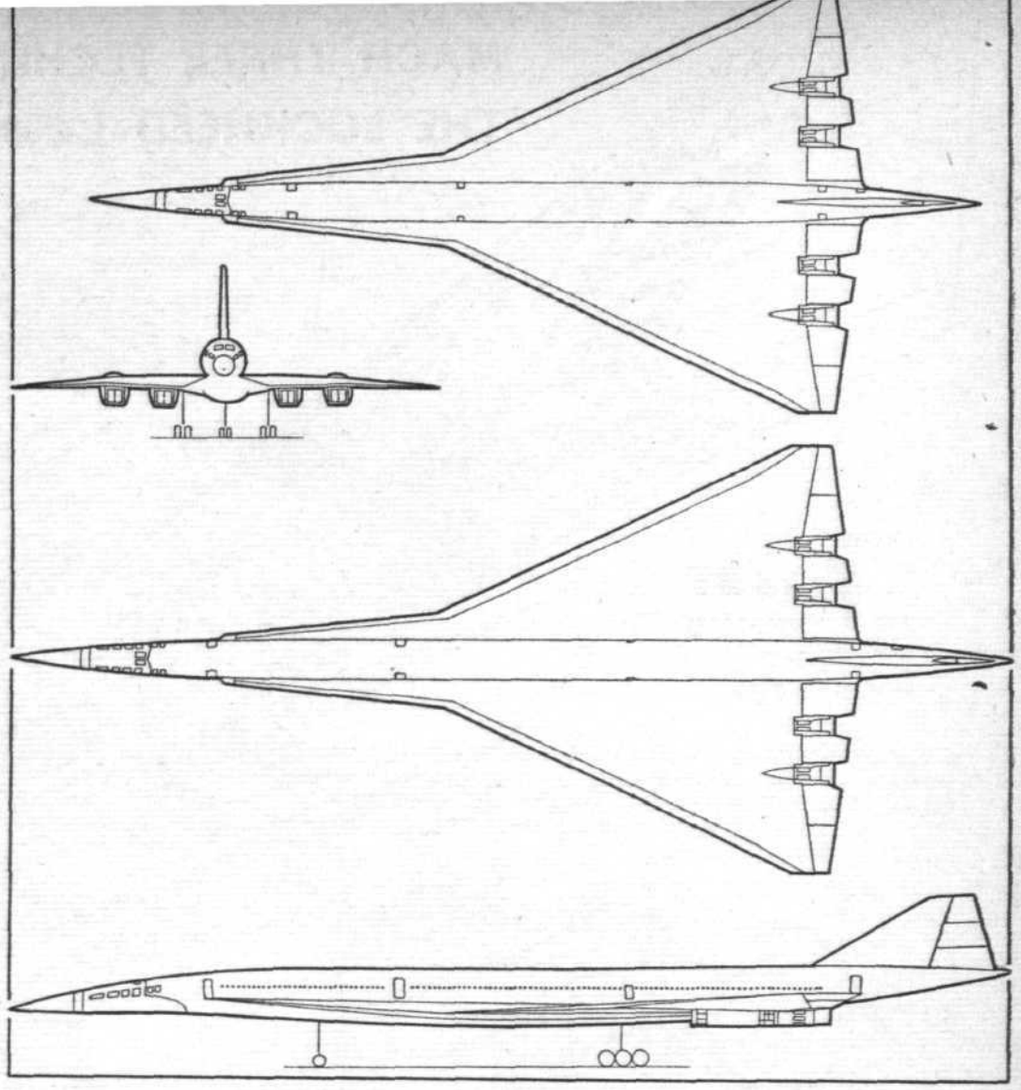
MACH THREE TECHNOLOGY

Lockheed's Supersonic Transport: Part 1—The Background; Aerodynamics; Propulsion; Airframe Structure



General arrangement of the Phase 2B Lockheed L-2000. The side elevation and lower plan view illustrate the large-capacity-fuselage version. The upper plan view shows the smaller-fuselage variant, cabin layout of which is illustrated in the upper drawing on pages 96-97

BY the end of the year the exploratory research work will have been completed, and the go-ahead decisions will be imminent on three mammoth American civil aircraft undertakings which could shape the development of world long-haul air transport for the rest of the twentieth century. During recent weeks Boeing and Douglas have been expected to announce entirely new and privately financed 400-seat subsonic long-haulers (Boeing 747 and Douglas DC-10) powered by high-by-pass turbofans and designed to offer the ultimate in passenger and freight economics.

Neither the booming worldwide demand for air freight capacity which was triggered off by the DC-8F and the 707-320C, nor the unquestionable response to lower passenger fares, shows any sign of slackening. Despite prospects of the faster but more costly and less versatile supersonic transport (SSTs may never carry a significant amount of freight) the decision of the biggest transport aircraft builders in the world to lay down second generation subsonic jets designed solely to cut costs would seem to be a comparatively safe gamble.

The decisions referred to in the opening sentence rest in the hands of the American Government, since it is they who are being called upon to provide virtually all the money. The choice is whether or not to pursue the SST as originally specified by the FAA—and if the answer is affirmative, which of the rival Boeing and Lockheed designs to support. Officially, the earliest moment when a decision could be taken is January 1967; and with industry paying increased attention to advanced subsonic design it seems unlikely that the SST will be any more economically competitive next January than it will have been for the previous 18 months. If the privately funded subsonic 400-seaters are well and truly launched this year, then the odds will surely be mounted against a government decision to invest in what effectively would be a rival design. If the 250-seat SSTs have turned sour by next year the industry will have two alternatives to leaving commercial supersonic air travel to the Anglo-French Concorde: to accelerate work on hypersonic or semi-orbital vehicles for the 1980s; and/or to look at smaller SSTs of Mach 2.2 or 2.7 design capable of competing directly with the Concorde for the prestige passenger market of the 1970s. Though the latter approach would be a painful reversal of principle it might be considered preferable to letting the Concorde go unchallenged, where it might otherwise sell to the tune of a hundred or more aircraft in America alone. Thus for the first time since mid-1963, when President Kennedy described the American SST as a project of national importance, events have cast a shadow over the commercial expediency of the venture as it now stands.

Aside from the broad issues of policy the rival Boeing and Lockheed teams continue to work at maximum effort on their SST submissions, which have reached an advanced stage of design and mock-up. The broad airframe and structural geometry of both the swing-wing Boeing 733 and the double-delta Lockheed L-2000 are settled following "Phase 2A" refinements (June-December 1964), and research is now concentrated on structural and production problems. Mr C. L. (Kelly) Johnson, Lockheed vice-president, advanced development, recently remarked that the technological foundation for a Mach 2.5 to 3 SST is "non-existent at the equipment level." He quoted 19 specific problems, ranging from the need for a special fuel tank sealant to stiffer machine tools for profiling. During the current "Phase 2C" 18-month study (July 1965-December 1966) changes affecting the overall efficiency of the aircraft are expected to come only from powerplant development. The contenders in this field, General Electric and Pratt & Whitney, are likely to run test-bed demonstration examples of their designs next summer. Shown graphically overleaf is the