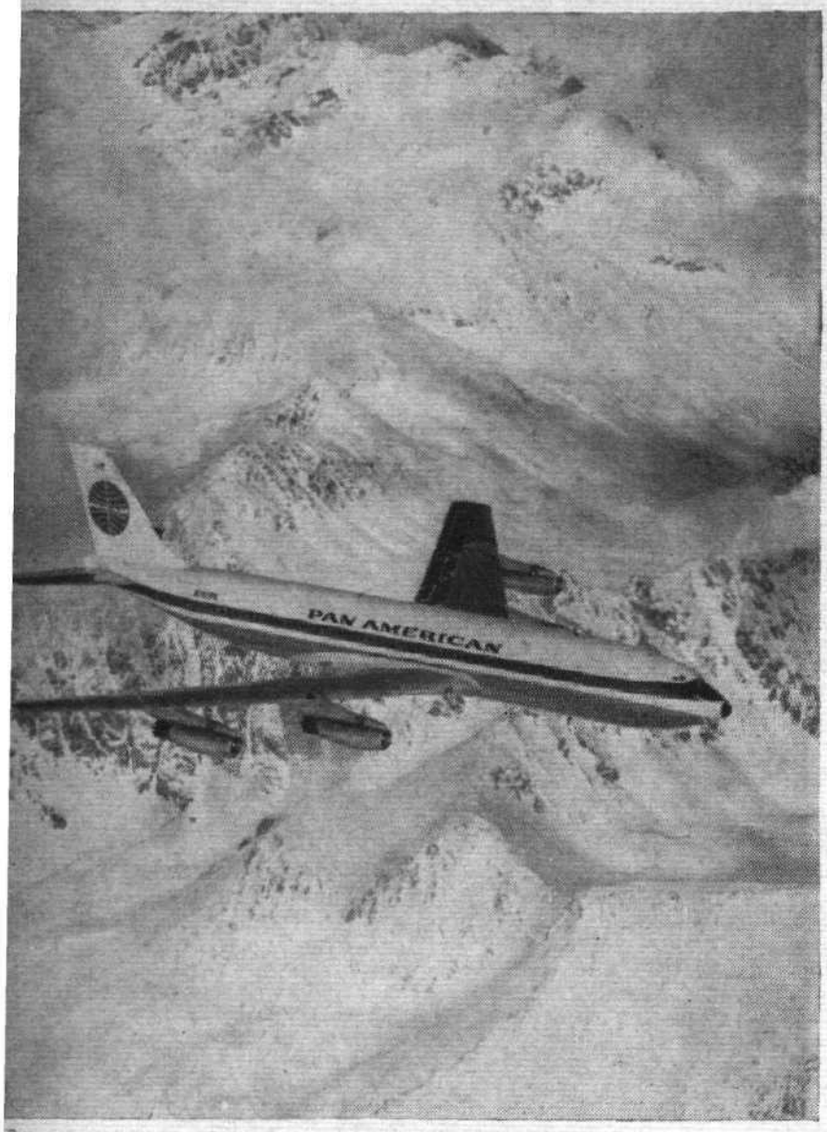

Boeing 707

Boeing Airplane Company, Seattle, Washington

RAPID progress has been made at Seattle since the first production Boeing 707 flew from Renton on December 20 last year. The second aircraft—a 707-120 destined for PanAm—made its first flight two months later and C.A.A. certification, which started with tests on the first three production aircraft, began on April 16 and was due to be completed this month.

Thus with a hustle that is typical of its manufacturer, the 707 is being worked up for the start of scheduled services. First off the mark will be PanAm, taking advantage of the pace of Boeing's development to introduce their first Boeing 707-120 on scheduled Transatlantic services perhaps as early as November 1, while they have already mentioned the possibility of bringing a 707 to Europe in August. If there is a lesson to be drawn from this rate of progress, it is that the maximum amount of rig testing is little substitute for aircraft in the air, and experience with the 367-80 prototype (flying since July 1954) and well over 100 KC-135 jet tankers enabled Boeing to aim for completion of the certification programme by this summer—not a long period for an aircraft that is some 200 m.p.h. faster than those that it will replace.

Variants of the 707, each adjusted to suit the needs of particular airlines, has resulted in a family of associated types. Broadly, there are only two basic models: the 707 Stratoliner and the 707 Intercontinental. On these two types, variations in the powerplant and length of fuselage account for a total of five different model designations. The Stratoliner has in every case the "small" (2,433 sq ft) wing but may have Pratt and Whitney JT3C-6 engines (707-120), Pratt and Whitney JT4A-3 (707-220), or Rolls-Royce Conway 505s when it becomes the 707-520, although none of the last-named has yet been ordered. In addition—and this feature is reflected only in the last digit of the designation number which specifies the customer—two fuselage lengths are available, resulting in overall lengths of 134ft 6in ("short body") or 144ft 6in ("long body").

The second of the basic types, the Intercontinental or overwater 707, intended for non-stop long range operations, is longer and heavier than the Stratoliner. (PanAm will be using -120s for Atlantic services at first, for the prestige and traffic value of introducing early jet services, but they may be expected to convert to 707-320s as they become available.) The first -320 is now in final assembly and will undergo C.A.A. tests before being delivered to the airline in 1959. All aircraft of this series feature the large (2,892 sq ft) wing and a maximum take-off weight of 295,000 lb (296,000 is permitted during taxying). Two designations, relating to the engine type, define the sub-divisions of this series. The Boeing 707-320 is an Intercontinental with JT4A-3s and the 707-420 is powered by Rolls-Royce Conways. As with the domestic Stratoliner aircraft, there is a choice of two fuselage lengths associated with the -320 and -420. The shorter is dimensionally similar to the longer fuselage of the 707-120. The longest fuselage of the three sizes is extended 80in over that of the intermediate length. All fuselages have a maximum external width of 148in.

Recently a new version of the Pratt and Whitney JT4—the JT4A-10—has been introduced and it is logical to anticipate that it will be specified for Intercontinental Boeing 707s, possibly accompanied by an increase in fuel capacity and in allowable maximum weight to top the 300,000 lb mark.

BOEING 720

Third of the Boeing 707 family is the Boeing 720. This aeroplane has previously been designated Boeing 717 and Boeing 707-020, but has now been distinguished to underline the fact that it meets a very different specification from the 707 series. While Boeing 707s of all categories are long-range aircraft, the 720 is designed for operation over ranges of 150 to 1,500 miles—the short and medium stages of the range spectrum.

Since less fuel is needed over the 720's operating range, a lower gross weight and a considerably lighter airframe have been made possible. Savings have been achieved in the wing, fuselage and landing gear, and at a gross weight of 203,000 lb (the corresponding weight for the short body -120 is 248,000 lb) the take-off field length performance has been reduced to 6,600ft. Boeing has attempted to achieve with the 720 as many features in common with the 707 as possible, while still producing an aircraft exactly tailored to the function of a medium jet and competing with the Convair 880. Since last November, the basic sales price has been slightly reduced to $3.4m—a very competitive figure.

COMMERCIAL HISTORY With 168 firm orders to hand, equivalent in value to near $1,000m, Boeing head the list of those selling turbojet transports. Although their 707 project moved under way in 1952 and the first flight took place in 1954, it was only in July 1955 that Air Force permission was obtained to manufacture transports concurrently with the KC-135 tankers upon whose design the 707 was based. **PanAm's** historic order for 20 Boeing 707s, together with 25 DC-8s, was placed in October 1955.

In the next two months three domestic trunk carriers placed orders for delivery in 1959-60: **American** for 30 (123s); **Braniff** for 5 (227s); **Continental** for 4 (124s). By December Douglas had broken into the international field with DC-8 sales to K.L.M., J.A.L. and S.A.S. Boeing countered by producing a new design, the Intercontinental 707-320 of which 12 were purchased by **PanAm.** Foreign airlines could now no longer afford just to look on, and before the year-end sales had been contracted with **Air France** for 10 (328s) and **Sabena** for 3 (329s). Early in 1956 **PanAm** realized the challenge of jet competition on intercontinental routes and changed the Boeing order once again, reducing the number of 121s to 6 (delivery in 1958-59) and increasing the number of 321s to 17 (delivery in 1959-60). During 1956 five new carriers purchased 707s: **T.W.A.,** 8 (131s) in February for delivery in 1959; **Lufthansa,** 4 (430s) in April for delivery in 1960-61; **Air-India,** 3 (437s) in August for delivery in 1960; **Qantas,** 7 (138s) in September for delivery in 1959; **B.O.A.C.,** spurred by the prospect of jet competition on both Commonwealth and Atlantic routes, 15 (436s) in October for delivery in 1960.

Over the last two years the incoming flow of orders from new customers has slowed down to 18 aircraft for four carriers: **Cubana,** 2 (139s) in June 1957; **Varig,** 3 (441s) in September 1957; **United,** 11 (720s) in February 1958; **S.A.A.,** 3 (320s) in February 1958—most of these being due for delivery in 1960. In addition to these, three previous customers increased their orders; Air France from 10 to 17; Sabena from 3 to 5; and, most valuable of all, if finally verified, T.W.A. from 8 (131s) to 15 (131s) and 18 (331s).

STRUCTURE Structurally, the Boeing 707 is largely conventional and changes in scale and detail only are made between variants. Extensive use is made of crack stoppers and alternative load paths to achieve fail-safety, but techniques such as integrally milled skins, spot welding or titanium panelling are sparsely