

# Stand Points

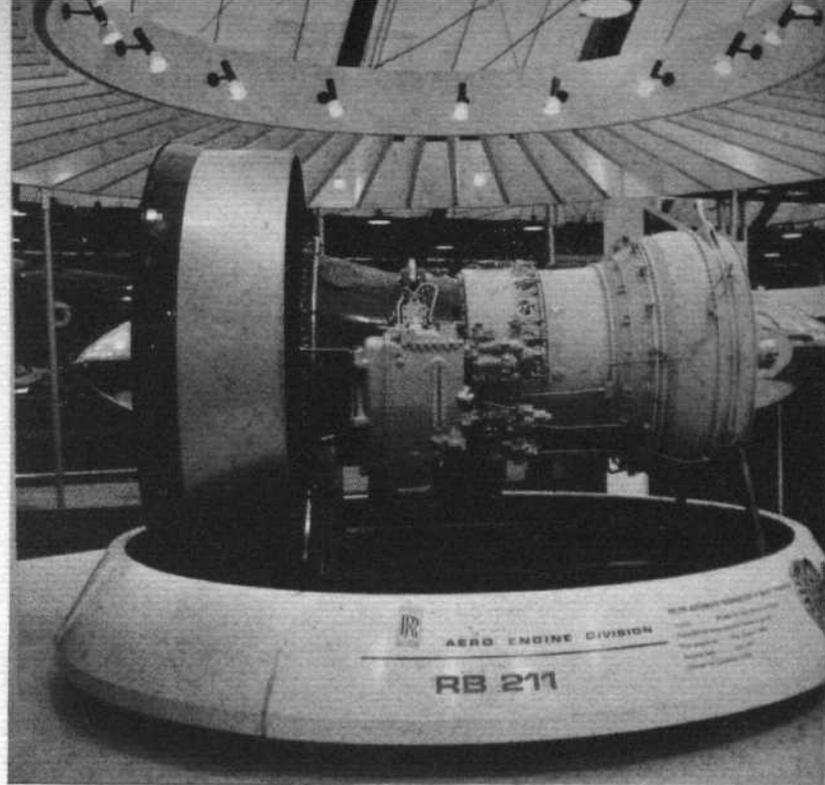
Highspots from the exhibition: illustrated mainly with "Flight" photographs and drawings

## ENGINES

For the first time **Rolls-Royce** was present at the Show in its new guise as the British aero engine industry. Only the manufacturers of "tiddler" engines—Alvis/Rover, Auto Diesels, Budworth, Plessey, Rollason and Rotax lie outside R-R's omnipotent coverage of the engine scene. Clearly emerging as central theme of the company's new family of turbine engines is their three-shaft configuration with modular construction. Three examples of the new family were exhibited—the large **RB.211** turbofan for the Lockheed L-1011 presented as the focal point of the R-R stand; a development **Trent** turbofan, five of which are being used to back up the **RB.211** programme; and the new Small Engine Division's **RS.360** twin-spool free turbine turboshaft. Not exhibited, but next in succession in the three-shaft series, are the mighty **RB.207** turbofan for the A-300 European airbus, and the **RB.199** turbofan being proposed by R-R's Bristol Engine Division for the multi-nation **ACA** project.

The 40,600lb thrust **RB.211**, which first ran well on schedule on August 31, was on display for the first time. Impressive by its large size and attractive in a combined black, silver, grey and duck-egg blue colour scheme, the metal mock-up show engine was equipped with compressor casing-mounted accessories and accessory wheelcases. The definitive configuration was depicted by a  $\frac{1}{4}$ th scale

*Rolls-Royce RB.211 turbofan mock-up with early accessory arrangement mounted on the compressor casing. The close relationship between engine overall diameter and length is evident*



model of the L-1011 rear fuselage centre engine installation. Here the accessories were mounted on the outside of the engine fan duct with the drive shaft from the high pressure compressor housed in a large radial streamlined strut. Access is then available direct through the rear fuselage cowl.

Features of the engine which were apparent included the use of a Lucas fuel system, Rotax miniaturised high energy igniter box, and 18 fuel injectors to the annular combustor. At the front, the 25 large Hyfil glass fibre reinforced composite material fan blades showed a distinct change of profile outboard of the fan/gas generator flow split—the inner section of the blades feeding air to the gas generator had little twist, but beyond this the outer part of the blade providing the fan slipstream became highly twisted. At the rear, the fan turbine tail-bearing support was provided by ten slightly tangential struts.

R-R plans to manufacture the various

Hyfil components for the **RB.211** within its own organisation, using raw material supplied by one or other of the large chemical companies. Hyfil fan blades are already in service in Conway turbofans powering **BOAC** VC10s. Several thousand hours' flying have already been completed by these blades, putting the service experience programme some three months ahead of schedule.

By the end of this year four, and possible five, **RB.211-22s** for the L-1011 intensive development programme will be undergoing bench trials. Latest R-R figures for the engine give (in addition to 40,600lb take-off thrust maintained to 84°F) a maximum cruise thrust at 35,000ft and Mach 0.85 of 9,267lb, a maximum basic dry weight of 6,353lb and a weight including accessories and installation features of 7,609lb. Overall diameter is 89.1in, and intake flange to turbine flange length is 130.7in.

For the **RB.207** (which was not exhibited), R-R states that the engine development programme, which has yet to have a first-run date designated, can be kept adequately in advance of the A-300 programme despite the lack of an official go-ahead on the project. The major proportion of **RB.207** component rig testing is now complete, including the fan, compressors, combustor and turbines. Manufacture of prototype engine has not been initiated. Latest version for the A-300 is the **RB.207-11** rated at 57,500lb.

Exhibited for the first time anywhere, a metal and glass fibre mock-up of the new 900 s.h.p. **RS.360** turboshaft powerplant for the twin-engined Westland **WG.13** helicopter showed a number of changes relative to the early details of the engine. Most apparent of these were the addition of cylindrical heat insulating cowls around the combustor and rear turbine casings. By means of the radial air gap between the casings and cowls and internal insulating material, the external cowl temperature is kept low

Cutaway view of Rolls-Royce **RS.360** turboshaft with Plessey Dynamics fuel system. The 900 s.h.p. engine is to power the Westland **WG.13** helicopter

