Continued from P35 the pilot adequate warning, and stall speed is lower than expected.
Cessna's performance estimates include no credit for the reduced cruise drag that results from natural laminar flow (NLF). Similarly, certification will take no account of NLF, as smooth airflow is easily dis-rupted by ice, rain or insect contamination. Nevertheless, Cessna is confident that oper-ators will benefit from the increased cruise speeds and reduced fuel flows.
While laminar-flow evaluation comes later in the l,000h flight-test programme, early flights have given Cessna confidence that NLF will be achieved. Evidence of laminar flow has been obtained on flights where the wing has been coated with a liquid-crystal "paint" which renders the boundary-layer airflow pattern visible. Cessna's confidence is also based on the success of work with NASA which led to development of the Citationjet's wing. The aerofoil used is a modification of a profile developed by NASA, which demonstrated natural laminar flow to 70% chord on a high-wing Cessna 210 Centurion. Modifica-tions to this aerofoil to ease the installation of flaps and ailerons and to reduce manu-facturing cost mean the Citationjet wing is unlikely to maintain laminar flow beyond the main spar skin join, says Kalberer.

KEEP IT SIMPLE

An example of the "keep it simple" philoso-phy is Cessna's approach to reducing the Citationjet's landing distance on wet or icy-runways. Where other Citations have thrust reversers, the new aircraft has a "thrust attenuation" system. This comprises pad-dles just behind the engines, which deploy into the exhaust flows to kill residual thrust. The paddles, first used on Cessna's T-37 military trainer, are deployed mechan-

The FJ44 engines make it possible for the Citationjet to compete with a turboprop

ically, by springs, and stowed hydraulically
or, as a backup, are blown back by increas-
ing engine thrust. The paddles can be
deployed in flight, to increase descent rate,
or on the ground, to slow taxiing speed.
On landing, the flaps extend an addi-tional 20°, to about 60°, to increase drag and assist in stopping the aircraft. This has proved "very effective", says Kalberer. Unlike other small Citations, the Cita-tionjet has a trailing-link main landing gear which results in a smooth ride during taxiing and better touchdowns: "It's hard to make a bad landing," says Kalberer. Cessna would like to fit trailing-link gear to all its aircraft. It was possible on the Citationjet only because the wing is totally new. On the ground, the gear — similar to that used on the Conquest twin-turboprop — gives the Citalionjet an attractive, but "un-Citation-like", tail-high stance.

Cessna Citationjet

FMMW.
© Reed Business Publishing Group

Simple does not mean unsophisticated. The Citationjet has Honeywell SPZ-5000-series digital autopilot and flight director with two-tube electronic flight instrument system, using 5in (12.5cm)-square displays, for the pilot only. The aircraft has Bendix/ King panel-mounted radios which, because of their location with the pressurised cabin, offer high reliability, says Cessna. Other avionics are in the nose forward of the baggage bay (there is more luggage space in the tail cone).
Equipment suppliers were not only set tough price goals by Cessna — having first had to compete for the business — they were also required to meet stringent relia-bility targets. Every component has a re-quired mean time between unscheduled removals which is to be substantiated in extensive reliability and maintainability tests planned during certification.

TEST FLYING

The first prototype Citationjet had logged almost 170h flying by mid-October, when Cessna embarked on high-speed and flutter testing. Preliminary performance is "pretty well on track", says Kalberer. Basic stability, directional damping and stall characteristics all look good, he says. Aileron forces need fine-tuning (all flying controls are manual) and engine airstarts have proved problem-atic. Williams is working on the fuel-control problem, and revised aileron gearing is to be fitted, says Kalberer. US FAR 23 certification is planned for late 1992 and Cessna may yet opt for simultane-ous US and European certification under Joint Airworthiness Regulations. Interna-tional customers account for an increasing proportion of business-jet sales, and more
than 300 of the 1,800-plus Citations deliv-
ered to date operate in Europe. For Cita-
tionjet the proportion would be higher:
more than 30% of sales logged so far are to
European customers. El

38 FLIGHT INTERNATIONAL 23 - 29 October, 1991