



John Marsden AMRAeS

- 1 Removable leading edge
- 2 Pylon upper spar
- 3 Lower spar

- 4 Front engine-mounting trunnion and torque links
- 5 Pylon/engine truss
- 6 Rear engine-mounting support and links
- 7 Fire seal
- 8 Front wingspar/pylon fitting
- 9 Rear pylon/wing attachment
- 10 Rear fairing
- 11 Inspection panels
- 12 Stage five bleed air to airframe
- 13 High pressure (HP) compressor discharge bleed air

- 14 Bleed air for active clearance control of HP turbine casing
- 15 Low pressure turbine casing cooled by bypass flow through piccolo tubes
- 16 Bleed air cooler
- 17 Ram air for cooler
- 18 Ram air exit
- 19 Air start supply line
- 20 Electric junction box
- 21 Acoustically lined intake
- 22 Hot air de-iced leading edge
- 23 Oil tank and accessories
- 24 Thrust reverser cascades
- 25 Thrust reverser blocker door
- 26 Translating cowl
- 27 Engine vent-air outlet
- 28 Bleed valve actuator
- 29 Variable-stator actuator

fore came as a pleasant surprise to CFMI.

In May 1979, Grumman Aerospace was contracted to make the pylons and nacelles, which were interchangeable rather than being "handed" (left or right) like the original JT3Ds. MDC agreed to provide engineering support to Cammacorp for the conversion work, to be carried out at the company's Tulsa, Oklahoma, site. In the end, conversions were also carried out in Atlanta as well as Canada and France.

Meanwhile, preparations continued at Boeing for the first flight of the "707-700", which took place on 27 November, 1979. The flight capped a tumultuous month for CFMI which, on 8 November, had received simultaneous certification for the engine from the FAA and French DGAC.

The DC-8 activity ramped up rapidly throughout 1980, with more airlines adding to the orderbook. In May 1980, CFMI initiated production plans for the programme, which had been renamed the DC-8 "Series 70". The first DC-8-61 was delivered to Tulsa by United on 30 September, 1980, and made its first flight just under a year later, on 15 August, 1981. An MDC test crew, headed by chief test pilot Phil Battaglia, took the aircraft aloft for more than 5h. "I've logged a lot of DC-8 hours, and I'd call

"I can hear the vultures flying around this building. If we don't get the United order tomorrow, we're dropping the whole thing," Rossignal quoting Ravaul

airline had decided to go for the CFM56, and not the competing JT8D-200. The CFM56 was finally "safe", just two weeks before the internal deadline set by GE and Snecma effectively to freeze the whole programme. "We needed a minimum of 75 aircraft, and I think we settled for 60. We estimated the total [DC-8] market was around 150, though ultimately we did 110 aircraft," says Smith.

United ordered 29 DC-8-61 retrofits, Delta 13 and Flying Tigers a total of 18, 16 of which were -63F freighters. Other big customers were to follow in the next two years.

It emerged just how close United had come to going for the P&W option. The airline had

initially favoured the JT8D conversion, which was priced at \$980,000 per engine, compared to \$1.5 million for the CFM56. Flying Tigers had performed the bulk of the engineering assessment and, on hearing about United's preference for the JT8D, asked it to reconsider. It told United that the CFM56-powered DC-8 would not require "cut back" procedures on climb out to meet the noise requirements of some local airports, whereas the JT8D version probably would. It also stressed that the long term fuel savings of the CFM56 would eventually more than compensate for the higher conversion cost. United's \$400 million order to re-engine its 29-strong DC-8-61 fleet with CFM56-1s there-

this one of the best flights in my experience - particularly since it was a first flight," said Battaglia, who added: "This was a full shake-down of a new series aircraft."

Some production "inefficiencies" slowed the pace of the Series 70 programme, and CFMI found itself in the thick of organising alternative conversion sites to get back on schedule. One site chosen was Delta's overhaul and maintenance base at Atlanta, Georgia, where 44 of the 110 aircraft were eventually modified. It was from Atlanta that a Delta DC-8-71 made the first commercial flight of the CFM56-powered derivative on 24 April, 1982, operating a scheduled service to Savannah, Georgia. After almost 11 years, the CFM56 engine had finally entered commercial service.

CFM estimated it needed to carry out a minimum of 75 DC-8 retrofits - it eventually completed 110

