
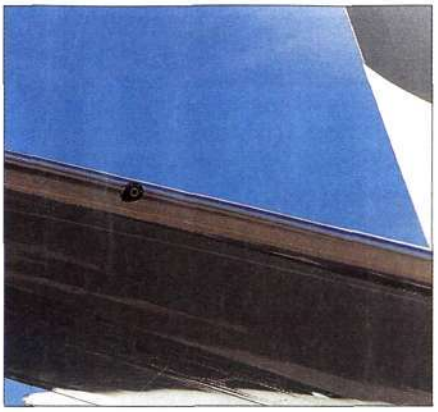


*External video cameras (centre) linked with a GMCS display in the cabin cockpit (right) help the pilots manoeuvre the long -300 on the ground*

overhead system control panels. The flight management mode and function selectors are ranged neatly across the glareshield and can be reached by both pilots.

The 777 cockpit is, however, less of a cybernetic centre than the equivalent Airbus cockpit is. Whereas Airbus has delegated pitch and roll control to a pistol grip sidestick, Boeing has kept a conventional looking control wheel, offering no overt clues that this is a fly-by-wire (FBW) aircraft. Computer-control of the aircraft means the wheel can be smaller than is used with hydro-mechanical systems. Computer technology has also been exploited to reduce the size of the undercarriage and flap levers. They retain their conventional handles shaped like a miniature wheel and an aerofoil section respectively, but the lever for the undercarriage is now little more than a switch.

## LOGICAL LAYOUT

The 777's large rudder pedals are adjustable for reach via a neat, small fold-away, crank handle between the pilot's legs. A flight bag will fit easily outboard of each seat and several useful panels with clips are on hand to take notepads or approach plates.

The 777-300's 73.8m (242ft) length raises significant considerations for the pilot while ground manoeuvring, taking off and landing. The cockpit is a long way forward of the main undercarriage and must be swung in arcs that are exorbitant distances from the pivot point at the main wheels during tight turns. To help the pilot keep the main wheels on or near taxiway centrelines, video cameras mounted in the tailplane and fuselage belly provide a Ground Manoeuvre Camera System (GMCS) display. GMCS is a popular customer option and, when selected, gives a three-segment picture of the nosewheels and both sets of mainwheels on the multifunction cockpit display. It helps the pilot to judge tight turns accurately.

## TANDEM WHEELS

Each main undercarriage leg has three pairs of wheels in tandem, a configuration prone to resist tight turns. The aft pair of wheels have axle steering to reduce turning radii, minimise thrust required and reduce tyre scrubbing. Because of the aircraft's weight and the engines' high thrust, conservative use of power during taxiing is essential to avoid environmental damage from the jet efflux.

The tiller worked well for a 90° turn as the cockpit crossed the centreline of the taxiway we were turning on to, and the tiller was light and easy to use. The main landing wheel's aft axle steering, which is activated automatically whenever the nosewheel deflection exceeds 13°, was transparent in operation. The mainwheel carbon brakes were smooth, powerful and progressive, but a little fierce when selected to standby for a check.

Bringing this large and complex aircraft to life in preparation for the flight has been impressively simple. Messer switched on the flight instrument and flight management systems using ground power. He then started the auxiliary power unit (APU). The start cycle was automatic, but he selected synoptic displays

## THE BOEING 777 – HISTORY

■ The 777 twinjet was launched into production in October 1990, providing Boeing's challenge to the Airbus A330/A340 and the then McDonnell Douglas MD-11. The aircraft is Boeing's first FBW airliner, and is the world's largest twinjet.

■ Two sizes of 777 are in production – the baseline 300/375-seat -200 and the stretched 370/450-seat -300. The initial -200 version entered service with United Airlines in June 1995. Deliveries of the -300 began in May 1998 to Cathay Pacific.

■ The baseline 777-200/200ER and -300 are offered with the General Electric GE90, Pratt & Whitney PW4000 and Rolls-Royce Trent 800 engines. New longer range derivatives, the -200LR and -300ER, are powered exclusively by the 110,000-115,000lb-thrust GE90-115B engine. The -300ER will enter service in September 2003 and the -200LR by January 2004.

**(See *Flight International*, 3-9 December 1997 for a full technical appraisal; 15-20 February 2000 for an in-service review.)**