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through a single centralised communications management system (CMS). The core software of this runs in the M-MMC.

As well as MIDS, IFF and the usual HF/VHF/UHF radios, the CMS is also designed to manage Selca (selective calling), Inmarsat satcom (available as an option), the various audio systems (including a wireless intercom, cockpit voice recorder and passenger address), emergency locator system and Comsec radio encryption/decryption system. Suppliers for the bulk of the system will be downselected in November, says Llamazares.

Flight control

As an outgrowth of its A380 FCS foundations, AMC is developing its own flight control computers (FCC). Four of these units will provide the heart and mind of the A400M fly-by-wire flight control system, which continues the long-established heritage of the Airbus commercial line. "We're doing this ourselves because of the very specific requirements of the aircraft. Although it will essentially be the same hardware as the A380, we will have to qualify them as new computers because this aircraft is powered by four turboprops instead of turbofans," he adds.

As with the civil Airbus family, the A400M flightdeck will be equipped with sidestick pilot controls. Through the FCCs, these command a piloting objective and not simply a control surface deflection. The commands also include load factor in pitch and roll rate in roll, which in certain conditions will be selectable under a "select and release" technique to reduce workload.

The FCC commands are processed through two channels, one of which controls and the other monitors. If the system detects a disagreement between the two, the problem computer is automatically disengaged. If all four FCCs fail, an independent electrical control system takes over to control the aircraft in roll, pitch and yaw.

Flight-control signals are transformed into movement by a redundant set of 20 servo-controls and actuators, seven on each wing and six in the tail. To ensure



An instantly recognisable Airbus flightdeck greets A400M aircrews, including HUDs and sidestick controllers

(T-GCAS) and the tactical threat database. This latter function is a database that provides all known threats to the crew via the navigation, tactical and multipurpose display and control display units.

Communications data such as frequency tables, auto-tuning and EMCON (emission control) are also housed in the memory of the M-MMS, which additionally acts as an interface between the cockpit display and the communications system, allowing the crew to control the appropriate transceivers.

The communications system is a sophisticated union of commercial and military radio suites. Linking the two is the military mission management computer (M-MMC) which "is a kind of bridge between the 1553B databus and the AFDX of the A380", says Llamazares. The 1553B data-

bus provides the standard military connection to systems such as the MIDS secure tactical datalink and IFF (identification friend or foe) transponder, while the Ethernet-based AFDX backbone links the bulk of the communications systems.

"It's a new concept, but we decided to do this because we wanted to keep the risk as low as possible. We had already started the A380 development, so for the civil part of the A400M we're trying to use as much of that as we can. However, at the same time, we also needed to implement the military business, so we decided this was the best way to go," Llamazares says. The M-MMC therefore provides a bi-directional gateway between the military and civilian data highways and allows the crew to manage the 1553B remote terminals as well as civil and military radios from the cockpit