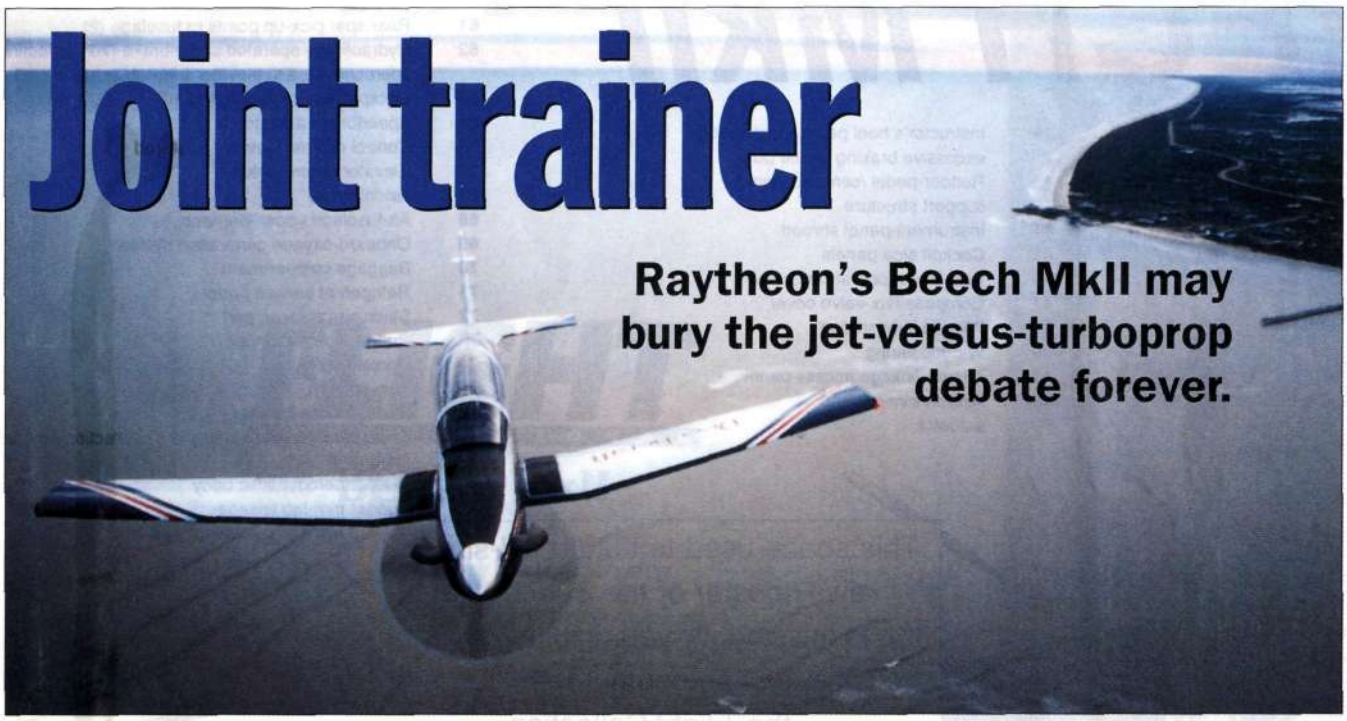
Joint trainer



Raytheon's Beech MkII may bury the jet-versus-turboprop debate forever.

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ILLUSTRATION BY GIUSEPPE PICARELLA

BY EARLY NEXT century, US Air Force and Navy pilots will undergo primary training on the same aircraft type — the Raytheon Beech Pilatus PC-9 MkII. This unprecedented co-operation will be made possible by the $7 billion Joint Primary Aircraft Training System (JPATS) programme.

Raytheon Aircraft was awarded a $4 billion contract in February 1996 to develop, produce and support the Beech MkII turboprop-trainer. As JPATS prime contractor, Raytheon is also orchestrating the competition for a $3 billion contract to design, build and support the associated ground-based training system, including aircrew training devices.

USAF students will come to Beech MkIIs fresh from Slingsby T-3 Firefly flight-screening aircraft and move on to upgraded Northrop T-38 Talon supersonic advanced-trainers. USN students will begin their flying training on Beech MkIIs and progress to McDonnell Douglas T-45 Goshawk carrier-capable advanced jet-trainers.

TRAIN AND SAVE

Despite their different origins and destinations, students from both US services will undergo primary training on identical aircraft — even down to the paint scheme. Beech MkIIs will replace the Air Force's side-by-side, twin-turbojet Cessna T-37s and the Navy's tandem-seat, turboprop Beech T-34s. Operating the identical training systems is expected to save the services billions of dollars over the life of the JPATS programme.

David Reimer, vice-president of Raytheon Aircraft's Trainer Systems division, gives the services credit for making the programme possible. "The Air Force and Navy did an exceptional job early on to get joint requirements. They had their differences, but they were always able to agree in the end," he says. Perhaps their greatest achievement is to agree that a tandem-seat turboprop is the best for the job.

The USAF initially attempted to replace the T-37 with the Fairchild T-46. This was a twin-turbofan aircraft with side-by-side seating, but the programme was cancelled after it fell significantly behind schedule and went seriously over budget. Raytheon began studying primary trainers, Reimer says, "...when we realised that the T-46 was not going to make it".

Reimer believes that the T-46 programme failed because Fairchild and the Air Force were reluctant to reconsider the early decisions which shaped that aircraft. "The T-46 concept was wrong, fundamentally wrong," he says, but "...our first decision — to pick the PC-9 — was absolutely right", he adds.

Raytheon's own preliminary-design studies resulted in primary trainers which looked like the PC-9, he says, "...so why start from scratch?" The company evaluated all of the then-existing aircraft. Only the Agusta S.211 jet-trainer was not available, having been selected by Grumman for its JPATS bid.

"The only aircraft we were convinced would be a winner was a derivative of the PC-9. It had the performance and handling for a primary trainer. We knew budgets would get tighter and life-cycle cost would be an issue, so a turboprop was cheaper. The other aircraft were too big, too heavy, too costly to build. The PC-9 was an aircraft with which we could come up with a winning strategy," he says. Raytheon's goal from the outset was the "...lowest acquisition-cost, lowest life-cycle-cost aircraft which meets the requirements at the lowest risk". Affordability is critical in primary training, Reimer believes. "You can't simulate fear in a simulator. You have to get students psychologically and physically ready, so there is a certain amount of flying you have to do. If that gets expensive, then you have a problem," he says.

SWISS ROLE

Raytheon teamed with Pilatus in 1990, and began tailoring the PC-9 to JPATS requirements. "Use of the PC-9 avoided a preliminary-design phase and allowed us to move rapidly to missionisation," says Reimer. "We knew the aircraft would need missionisation, and we decided to do it all before contract award. All the changes were in the prototype provided for the [JPATS] flight evaluation," he says.

The PC-9 has "excellent" spin characteristics which Raytheon did not want to lose in making the changes needed to meet the JPATS requirement, Reimer says. The flight characteristics were improved, but most of the changes made were to the powerplant and systems.

A more-powerful Pratt & Whitney PT6A-68 turboprop was installed to provide the sustained-manoeuvre performance required. The engine is thermodynamically rated at 1,270kW (1,700shp), but is derated to 820kW to increase the time between overhauls and so reduce life-cycle cost. Pressurisation was added, a zero-airspeed/zero-altitude escape system installed and the canopy and wing redesigned to withstand a 1.8kg birdstrike at 270kt (500km/h). Other changes included single-point pressure refuelling and a missionised JPATS cockpit. Raytheon received two PC-9s from Pilatus. ▶