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The world's largest simulator fleet
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HE world's largest civil aircraft simulator fleet is
operated by Flight Safety International, which has its
headquarters at LaGuardia Airport in New York and
operates 18 learning centres in the US and France. FSI's
fleet of 29 simulators will grow to 37 by the end of this year, and includes large modern airline types (such as Concorde, A300 and DC-10), smaller and older airliners (DC-6, DO-7 and Electra) and many of the world's cor-porate types.
Aircraft manufacturers usually include transition train-ing for one or more crews in the purchase price of new aircraft. But most manufacturers have elected to have this training carried out by an outside organisation in-stead of setting up their own operations. For each aircraft type FSI establishes a learning centre, including class-rooms and simulators, in a separate building close to the factory in which the aircraft is made. Crews can thus receive transition training when they come to pick up the aircraft. Such a location has the added advantage, especially for corporate operators, of offering convenient crew refresher training when the aircraft is brought back to the factory for a major overhaul.

There are learning centres for the DC-10 at Long Beach, Gulfstream at Savannah and Sabreliner at St Louis, plus separate centres for the Learjet, Citation and King Air in Wichita. The A300 and Concorde centres at Toulouse were set up by Aeroformation, a joint venture by FSI, Airbus Industrie and Aerospatiale. FSI is also planning a Canadair Challenger operation in Montreal. US centres for aircraft manufactured abroad are located close to the American distributor, and include a Falcon facility at Teterboro, and Westwind and HS.125 centres at Wilm-ington.
FLIGH T SAFET Y INTERNATIONA L SIMULATOR S

Operational:
A300*
Citation*
Concorde*
Convair 240/340/440
DC-6/7
DC-9
DC-9A*
DC-10*
Electra
Falcon 10*
Falcon 20
Falcon 20*
Falcon 20*
Gulfstream I
Gulfstream I*

Gulfstream II
Gulfstream II*
HS.125/700
Jet Commander
JetStar

King Air C-12*
King Air 90
King Air 200*
Learjet 24/25
Learjet 35/36*
Sabreliner 40/60
Sabreliner 40/60*
Sabreliner 75/80*
T-39*

O n order:
Challenger*
HS.125/700*
2 Learjet 24/25*
Learjet 35/36*

Merlin Metro*
MU-2*
Westwind 1124*

*Digital/visual type.

In addition to transition training carried out under con-tract to manufacturers, FSI also converts crews for opera-tors who need more flight-deck manpower or who have bought used aircraft. The major activity at each centre is however recurrent training under contract to operators. While most airlines prefer to have their own training programmes and simulators, corporate operators can rarely afford such a luxury. FSiI therefore has contracts with almost a thousand companies for recurrent training of corporate aircraft crews.
James S. Waugh, FSI director of marketing, tells Flight that FSI does almost all of this work under annual con-tracts, with a flat price for "training to proficiency" so that the customer does not have to change his budget if some pilots need a few extra days. The price includes ground school and simulator training "on both normal and abnormal procedures". Crews can schedule sessions to suit themselves, often coming in for a few hours when their aircraft are in the vicinity for other reasons.
Typical annual prices per pilot for recurrent training are $1,500 for the Merlin Metro, $1,800 for the King Air 90, $3,000 for the 'Citation and $4,600 for the Gulfstream II. Dual-qualified crews can take a second, less costly,

programme at no additional cost. For example, a Falcon crew which also flies the Learjet could take recurrent training on both types for the $4,000 price of the Falcon programme.
R. William de Decker, manager of the Falcon centre at Teterboro, says that FSI tries to encourage each crew to come in every six months for about two or three days. "Airplanes are complex machines and you tend to forget. If the machine is operating without any problems day in and day out, which is what it is supposed to do, there is a tendency to forget what you are supposed to do when something does go wrong."
The usual argument for using simulators instead of actual air time for refresher training and check flights says that simulation is cheaper and safer. But Mr Waugh feels that a simulator can also do the job better and, in one sense, be more realistic. He explains: "When a pilot goes on a check ride he probably knows everything the instructor is going to do. He is expecting you to pull an engine, but he knows that you are just going to pull it back to idle and that you are not going to start a fire. He also< knows you are going to do it in pretty good weather because you have airport restrictions and you can't do certain things in bad weather.
"Not so in a simulator. We can create real live situations and create the domino effect. For example, when you have a fire, you are probably going to have an electrical failure somewhere, and all of this can be happening in bad weather while you are starting to lose navigational gear. So here you are coming down the approach on one engine in bad weather and landing on a wet runway—things you don't get to practice in an actual airplane."
FSI now uses simulators from three different manufac-turers—Singer-Link, Redifon and Atkins & Merrill—and has ordered a Challenger unit from CAE Electronics of Montreal. Sixteen of the 29 simulators now in use, and all of those on order, embody digital main computers and have visual systems. Other existing simulators will soon have visuals added.

"The visual-type simulator," Mr de Decker explains, "covers that important segment of flying from 250ft on down to the ground, which you don't have in a non-visual simulator. With an old-style simulator you are relying on the instructor to tell you 'OK, you did it right. You landed on the runway and you stopped before you ran off the end.' With the visual-type simulator the instructor doesn't have to say anything. The student sees it right there in front of him and if he didn't do it right, he knows it."
I sampled this philosophy in FSI's Falcon 20 simulator at Teterboro. Sitting in the left-hand seat of a jet for the first time in 20 years, and coming in for a landing at night with low visibility, a wet runway and a stiff crosswind, I drifted left and off the runway. The incident might have been simulated, but the sweat on the pilot's brow was real. "The visual simulator," says de Decker, "can also intro-duce weather problems and can go into much higher fidelity in systems failures. With a digital computer you can fine-tune the sequence of events, such as an engin which loses its oil. The first thing that happens is that the oil pressure goes to zero. Nothing further happens for another 30sec or a minute. At that point the engine will start to vibrate a little bit. Later some of the accessories will drop off the line. And if you let it go to its ultimate conclusion, the engine will pack up. You can program the digital computer in the exact sequence that the engineers tell you it will happen. With the old-style analogue simula-tor this was very difficult to program because you didn't have the luxury of being able to put in the time sequence."

FSI has about 150 airports in its library of visual-system programs and is constantly adding new ones. All of its visual simulators have night-scene capability only, and FSI sees little need for simulation of day views. James Waugh explains: "We feel that the state of the art is best exemplified right now by the night scenes. And if a pilot can handle the problems at night, he can certainly handle them in the day." WARREN GOODMAN