

HOW SAFE IS CORPORATE AVIATION? ● R-R STUDIES NEW BR700 ENGINE

FLIGHT

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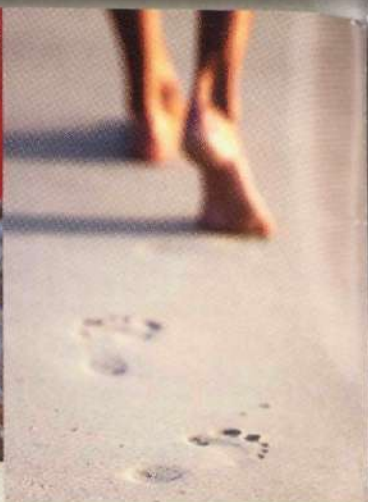
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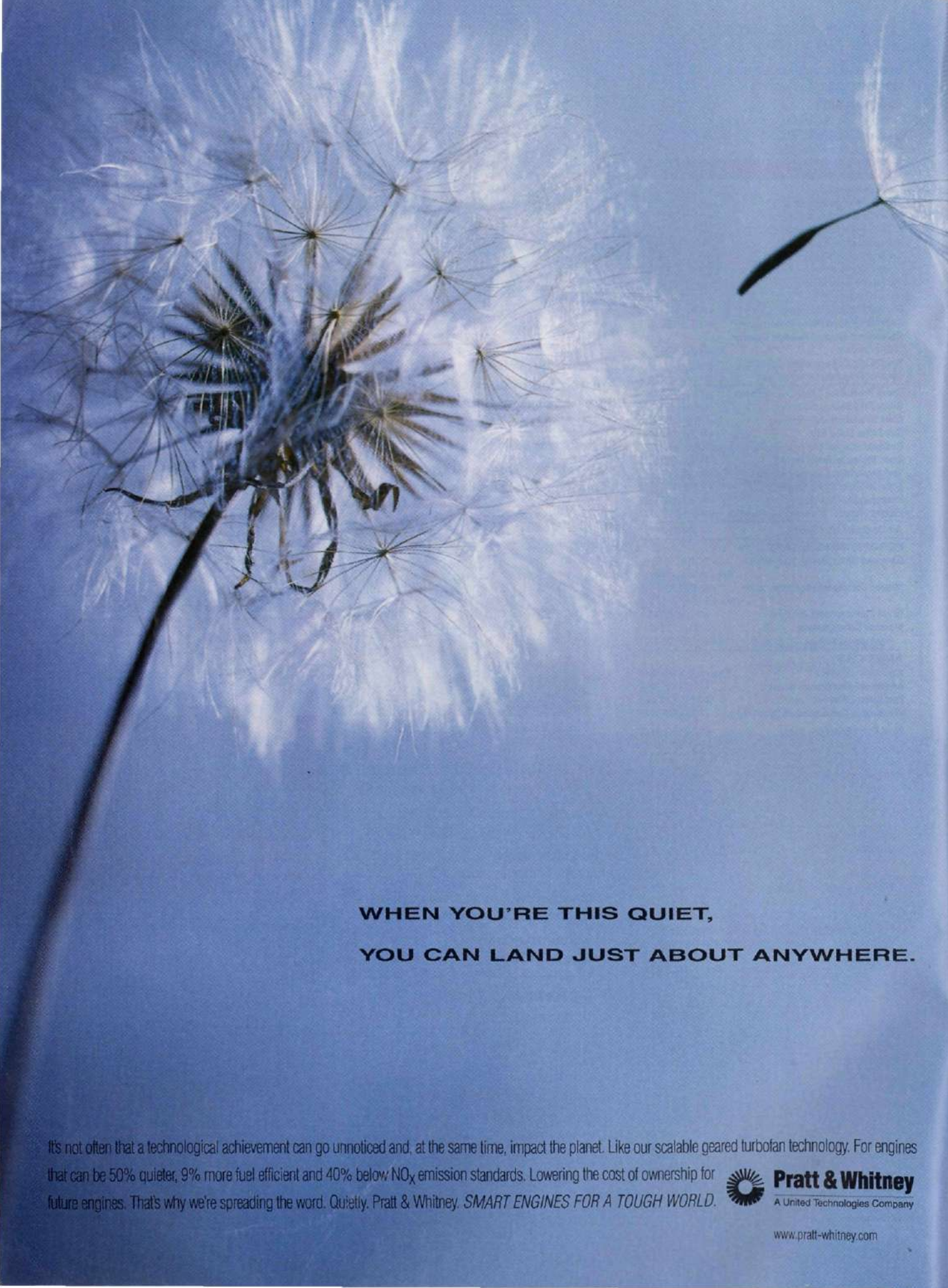
NEXT WEEK



Flight International tallies ageing fleets in its annual census and explores the issues facing Atlantic Airlines' Electras.

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COMMENT

LEFT UNSAID

FINALLY, THE figures for the number of unsafe "foreign" aircraft landing at Europe's airports have been published. This is an excellent start, but only a start. The information assembled could – and hopefully will – be used to much greater effect than it is now.

The report is almost more remarkable, unfortunately, for what it does not say than for what it does.

The Safety Assessment of Foreign Aircraft (SAFA) scheme is relatively new. It was set up in 1996 and did not really become operational in the field until the following year. It was not until Europe saw the USA's International Aviation Safety Assessment (IASA) programme in operation, and could see that the now-implemented plan for the International Civil Aviation Organisation to carry out national

safety audits was firmly on the rails, that the always slow, timid, traditional and cautious Europeans decided to do something themselves. SAFA was the result, and it has huge potential to improve airline safety among all the carriers – both Europe-based and "foreign" – which use European airports.

The ICAO and US systems are "top down" checks. They audit a state's capacity to carry out its ICAO-defined safety oversight and enforcement duties, and its actual performance in doing it. SAFA is a "bottom up" check. Inspectors go direct to the front line – airport ramps – to check out the ultimate product of effective safety oversight: the aircraft and flight crew themselves. It works because the discovery of a series of unsafe aircraft registered in the same state is a health check on its national safety oversight system, as well as enabling the aircraft to be grounded if the deficiencies are serious enough to warrant it.

SAFA's work, however, needs to be more standardised. ECAC has already identified that there are "substantial variations from one State to another" in filing reports. Some states, the ECAC report says, carry out fewer but more targeted inspections yielding large quantities of data, others undertake many inspections at a more cursory level.

It does not, however, say which states these are

or what it plans to do about standardisation.

In fact there are many things that the report does not say. It reveals that 58% of all checks carried out were on ECAC-registered aircraft, and the remaining 42% on non-ECAC aeroplanes. This may demonstrate admirable fairness and

thoroughness, but it does not say which group produces the larger number of deficient aircraft or unlicensed pilots.

There are a few ECAC countries which give details of which airlines or states of registration feature most prominently as safety-deficient in their SAFA inspections, but most refuse any detail. ECAC itself refuses to provide any.

It is continually surprising how governments and civil servants forget for whom they are doing their work and why. SAFA's immediate task

may be to gather data, monitor the safety oversight of individual states and to ground unsafe aircraft until they are repaired, but this is not an end in itself. The purpose is to make travel safer for the public, who are the same people whose taxes fund organisations like ECAC and the JAA.

ECAC has made a start in publishing some bald figures about what faults SAFA is revealing, but no attempt is being made to provide information about who the miscreant airlines are so that the travelling public can make up their own minds about which airline to travel with.

Withholding this information from the public is unreasonable, arrogant and smacks of a "teacher knows best" attitude to the people on behalf of whom SAFA was set up.

This is true just as much at a national as at the ECAC level. The information gathered during the SAFA inspections programme should be put in the public domain immediately it is known so that those who are making a decision about which airline to use to fly from their local airport can do so on safety as well as cost or schedule grounds.

Finally, and crucially important, "naming and shaming" airlines is a far more effective way of enforcing safety than diplomatic exchanges between nations.

See *Air Transport* P9



"Withholding this information from the public is arrogant and smacks of an attitude"

Currency slip hits Australian DoD

PETER LA FRANCHI/CANBERRA

A REVIEW of foreign currency exchange exposure on Australian defence projects has revealed that the costs of the Royal Australian Air Force's Hawk Lead In Fighter project have risen by AS\$98 million (\$56 million) since contract signature because project costs had not been hedged against exchange-rate changes.

The review, carried out by the Australian National Audit Office, also found that the cost of two Boeing CH-47D Chinook heavy-lift helicopters has risen by AS\$15 million since contract signature in June 1998.

The Audit Office also reveals for the first time that Australia's decision to acquire 11 rather than 14 Kaman SH-2GA helicopters was due to a failure to effectively manage foreign-exchange dealings. The audit found that currency exposure has added AS\$42 million

to the total project budget since contracts were signed in June 1997 and warns existing arrangements mean that costs are "likely to increase further".

The audit found, however, that the exchange arrangements for Australia's purchase of Kongsberg Penguin anti-ship missiles could work in the Department of Defense's (DoD) favour, and may see a reduction of project costs by AS\$630,000.

The audit, released on 31 May, criticises the DoD's financial management practices, including the reliance on the use of spot exchange rates in evaluating competitive tenders. It says exposure on currency deals has added AS\$2.98 billion to the cost of 220 current defence acquisition programmes. The exchange increases have exacerbated defence budget shortfalls which have resulted in programme cutbacks and a review of spending on all major projects.

The review warns that in the CH-47 case, a major shift in exchange rates between the Australian and US dollars is an incentive for Boeing to delay delivery.

Boeing is facing liquidated damages of AS\$4,700 a day for failing to meet a contract deadline of 18 March 2000. The audit report estimates that the company could make additional profits of up to AS\$6.3 million if delivery fails to occur before June 2001 because Australia made advance payments

of 50% on the \$44.74 million deal at contract signature.

Australia's June 1997 deal for 22 BAE Systems Hawk 100 trainers comprised a AS\$39.6 million contract with BAE Systems Australia and a £327 million contract with BAE in the UK. The DoD elected to use unhedged forward exchange rates for the deal, with subsequent shifts in the value of the Australian dollar "resulting in the project budget increasing by AS\$98 million, or 12%". □



Costs of the Hawk project have risen by \$56 million

CDG growth gives Air France its best year

AIR FRANCE has posted the best annual results in its history on the back of growth at its Paris Charles de Gaulle (CDG) hub. British Airways, meanwhile, is reportedly pressing for a third runway at London Heathrow, CDG's main European rival.

Air France posted a 34% increase in operating profits to FF2.35 billion (\$335 million) on a turnover of FF67.7 billion (up 13.5%). Net profit rose 42%, to FF2.32 billion, despite unfavourable exchange rates and higher fuel costs.

The carrier's president, Jean-Cyril Spinetta, says it bucked the European trend thanks to controls on unit revenues, cash from the Delta Air Lines alliance, FF3 billion in cost savings, and – crucially – growth at CDG. Air France carried 39.8 million passengers in its financial year, with traffic up

12.1%. Load factor grew to 76.1% on an 11.2% capacity hike.

A new terminal dedicated to Air France opened at CDG last year, and another is planned for 2003. A third runway has opened and a fourth is due in 2001, taking passenger capacity from 32 million to 55 million. CDG has already outstripped Heathrow – which had 62 million passengers last year – in movements.

BA's plan is said to call for a third "narrowbody" runway at Heathrow, to take pressure off the present two by handling short-haul flights. The strip would have its own small terminal. BA has long pressed for a fifth major terminal at the airport, but the project is bogged down by environmental concerns.

Spinetta confirms Air France is ready to sign letters of interest for the Airbus A3XX. "We're thinking of around 10 aircraft", he says. □

BA scraps Olympic investment

GUS VLASSIS/ATHENS
CHRIS JASPER/LONDON

BRITISH AIRWAYS has scrapped plans to invest in Olympic Airways, a move which means the Speedwing consultancy's management contract with the Greek airline will be terminated.

BA, of which Speedwing is a subsidiary, had been due to make an offer for 20% of Olympic by 28 June, but last Friday told the Greek Government that the deal was off. The UK flag-carrier adds that the split was by "mutual agreement", while Athens sources say the two concluded "a peaceful divorce".

BA was given first option on acquiring a share in ailing Olympic as part of the Speedwing deal, but withdrew after new chief executive Rod Eddington decided the move was against his focus on core activities. Athens valued the Olympic group at \$300-400 million, based on consultants' reports – significantly higher than BA's estimate. "Having just sold Air Liberté

because it was loss-making and a non-core business, it would have gone against the grain to invest in Greece," says an airline source.

New offers will now be invited for Olympic, with Speedwing's contract – running until the end of 2001 – due to be terminated soon. The privatisation of the airline is central to the freeing up of state aid frozen by the European Commission and regarded as vital to the airline's rehabilitation. The Greek airline's main value is in its new base at Athens Spata airport, due to open next March.

The Speedwing management team, led by Rod Lynch, was called in to make Olympic fit for privatisation, but was criticised in Greece for failing to turn it around. Speedwing sources defend its record, saying "costs are now a bit lower, revenues are significantly higher, and the product has changed beyond all recognition". One source adds: "Revenue management – which was all over the place – is still the big problem". □

R-R studies BR700 variant to power large regional jets

ANDREW DOYLE/MUNICH

ROLLS-ROYCE (R-R) Deutschland is studying a new BR700 derivative to counter rival offerings from Pratt & Whitney and General Electric for 90-seat and larger regional jets. The engine is tentatively slated to become available from early 2004.

The powerplant would be aimed at the 16,000-23,000lb (71kN-102kN) thrust range, plugging gaps between and above the R-R German subsidiary's BR710 and BR715 products, says R-R Deutschland head of marketing and sales, Mike Corne.

The BR710, in service on the Bombardier Global Express and Gulfstream GV long-range business jets, is currently offered at up to 16,000lb-thrust while the BR715 powers the Boeing 717-200 with a 19,000-21,000lb rating.

"The new derivative would allow us to fill existing gaps in the thrust range and position ourselves for opportunities that may arise," says Corne.

The preliminary design phase is over and the next stage will be to "move forward to some kind of frozen configuration. We are taking the studies to the point where we can have something readily available," he adds.



The R-R engine could be a candidate for the Boeing 717-100 shrink

The proposed Bombardier BRJ-X would appear to be a candidate for possible airframe applications, though the Canadian manufacturer is thought to favour the P&W PW6000 for this aircraft. It is understood that the new engine could also be a candidate for the proposed 717-100 shrink, and a higher-thrust version a contender for the stretched 717-300.

Other potential applications include the proposed Alliance family of 70-110 seaters, the Tupolev Tu-334 and re-engined MD-80s. It is also pushing the engine as an optional powerplant for the growth Fairchild 928JET and Embraer ERJ-190-200.

The new BR700 derivative could be developed at a much lower cost than the comparable GE

CF34-10, Corne believes, as the latter is an all-new engine. The latest member of the CF34 family has been selected to power the 928JET and ERJ-190 models.

Whereas the BR715 uses the same core as the BR710 with the addition of a two-stage booster (low-pressure [LP] compressor), the proposed new derivative would be a more efficient, low-weight boosterless design, with lower acquisition and upkeep costs.

As envisioned, it would combine the combustor, two-stage high-pressure (HP) turbine and slightly modified LP turbine of the BR715 with an all-new nine-stage HP compressor to be developed using "3D-aero" technology. The design would be completed with a larger, wide-chord, fan and LP turbine. □

Companies in talks to create Japan's first private launcher

Ishikawajima-Harima Heavy Industries (IHI) is in talks with Lockheed Martin and five other companies to establish a satellite launch company based around the J-1 launch vehicle.

Once established, the venture would be Japan's first privately funded company developing rocket technology, which has up to now been the responsibility of the National Space Development Agency (NASDA).

The other companies involved are Aerojet, Kawasaki, Mitsubishi, Japan Aviation Electronics and IHI Aerospace which has been set up to take over Nissan's aerospace division from 1 July.

The new venture would be expected to contribute about a third of the estimated ¥40 billion (\$374 million) needed to adapt the J-1 to commercial small-satellite launches. The partners anticipate a demand for about 1,000 small-satellite launches over the next 20 years. The venture is expected to begin commercial launches from 2004, at an estimated cost of ¥3.5 billion per launch.

The current variant of the J-1, first launched in 1996, is a three-stage, solid fuel launch vehicle, capable of putting small, 870kg satellites into low Earth orbit at 250km. According to local press reports, the modifications should allow the launch of 3-tonne satellites up to 200km. □

Iberia pushes on with shake-up

IBERIA HAS adopted a three-year strategic plan involving fleet rationalisation, the adoption of a management structure modelled on British Airways and American Airlines, a move to internet and electronic ticket sales, and the establishment of cargo, maintenance and other activities as autonomous profit centres under a new holding company.

The plan, running until 2003, does not involve a major restructuring, however, and Iberia presi-

dent Xavier de Irala says it entails a "continuation of the strategy we have used between 1997-99, which saw all of our targets easily met".

Iberia, which is aiming for an initial public offering this year, plans to retire all its McDonnell Douglas DC-9s and DC-10s, and Boeing 727s during the three-year period, cutting the number of types in its fleet to six. A 31% rise in available seat capacity is nevertheless being targeted through better aircraft utilisation, from 7.9-8.9h per day.

The adoption of internet/e-ticket sales should cut transaction costs by 70%-80%, while the move towards separate profit centres will allow units to seek allies and outside investors. Iberia forecasts an annual 8.4% increase in turnover to 2003, to €18.6 billion (\$17 billion), with profits growing to €900 million. Return on investment should improve from 15% to 16.6%, via a 10% cut in unit seat-kilometre costs and a 23% improvement in productivity. □

NEWS IN BRIEF

CELEBRITY ACCIDENT

Another fatal business aviation crash involving celebrities occurred on 1 June at Rowley Mile racecourse, Newmarket, UK, the latest in a series of accidents involving high profile personalities. Jockeys Frankie Dettori and Ray Cochrane survived the Piper PA24-220T Seneca accident with minor injuries, but the pilot was killed. See corporate and general aviation safety review, P48.

Virgin Express to lease 737-700s

VIRGIN EXPRESS is to expand its fleet by 11 Boeing 737-700s over the next three years, as the airline prepares to cease most of its charter operations.

The Brussels-based low cost, no-frills airline will stop regular charter work when its 2000 summer season finishes in October after the decision of tour operator NUR not to renew its contract.

The move will free up four aircraft for scheduled services. Traditionally, 40% of its business has come from charter work, and the airline plans to continue to operate ad hoc charters where possible.

Virgin Express will receive eight of the eleven 148-seat 737-700s on lease from GE Capital Aviation Services (GECAS) between July 2001 and April 2003, and three similar aircraft from International Lease Finance, two in 2002 and one in 2003.

The airline's current all-Boeing fleet includes twenty-three 737s, thirteen 737-300s and 10 737-400s. The new 737-700s will replace some of the older aircraft, but not all, as the airline intends to expand its fleet to around 28 aircraft.

After a poor first quarter of 2000 due to the poor dollar exchange rate and rising fuel prices, Virgin Express is to drop a number of loss making services. These include Rome-Madrid, Rome-Barcelona and Brussels-London Stansted. Services from Brussels to Copenhagen and Nice will increase. □

NEWS IN BRIEF

■ **COMANCHE EMD SIGNED**
Boeing Sikorsky and the US Army on 1 June signed a \$3.1 billion engineering and manufacturing development contract for the RAH-66 Comanche helicopter. The signing came following the Defence Acquisition Board's go-ahead, and the US Army leadership signing off an Aviation Modernisation Plan that recommends acquisition of 1,213 Comanches for \$34 billion.

Ansett 747 acquisition to raise long-haul capacity

PAUL PHELAN/CAIRNS

ANSETT International is planning a major boost to its long-haul capacity with the addition of two Boeing 747-400s every year for the next six years. The move has recently been approved at board level, it is believed.

The aircraft are expected to come from Singapore Airlines, but the carrier will not confirm the acquisition and has not identified intended changes to its present route structure. The acquisition will mean a radical switch in the make-up of a fleet which currently has only two 747-400s in its mix. Capacity on international

routes is mainly provided by 10 Boeing 767s.

The airline, currently in the throes of a full takeover by 50% owner Air New Zealand, has, however, already signalled its plans to begin flying between Australia and the US West Coast in its own right, and existing agreements provide automatic approval for up to four weekly services for start-up carriers on the route, with built-in provision for growth.

Airline sources believe Ansett will progressively replace at least some of Air New Zealand's daily direct services between Sydney and Los Angeles, to exploit the Australian brand on the route and

allow Air New Zealand to re-deploy some of its existing capacity on Asian routes. Ansett has also applied to the International Air Services Commission for extra capacity to Japan and Singapore.

While the carrier prepares to raise its international profile, it is continuing to pare its domestic operations with a decision to hand over several loss-making BAe 146 services in Northern Australia to two independent regional carriers. Brisbane-based Flight West Airlines is the main beneficiary taking over several routes from Cairns with Fokker F28s. Airnorth will takeover the Ayers Rock/Alice Springs services. □

USA blocks Greek engine buy



The model of Greece's F-16 Block 50 Plus includes a low-observable nozzle

THE US Department of Defense has refused to allow Greece to select a 32,000lb thrust (142kN) engine to power the 50 Block 50 Plus Lockheed Martin F-16C/Ds ordered this year. The Greek air force has been forced to accept a 28,000lb-thrust rated engine. As a result Athens has selected Pratt & Whitney's F100-229.

The extra thrust was required as the fighters will be fitted with conformal fuel tanks and operated in

hot take-off conditions, say European industry sources. The engines may be upgradable to the higher thrust later. P&W's success overturns Greece's previous preference for General Electric's (GE) F100 engine for its new F-16 fleet.

Although GE was selected to provide its 32,000lb-thrust F110 for the United Arab Emirates Block 60s, P&W has won other recent F-16 powerplant orders from Israel and South Korea. □

Embraer plans to buy Sichuan ERJ 145s

EMBRAER HAS signed a letter of intent (LoI) with China Aviation Supplies Import and Export (CASIC) and Sichuan Airlines for the acquisition of five ERJ-145 regional jets.

The order, first revealed in December, will introduce the 50-seater into the Chinese market. Sichuan operates a fleet of five Airbus A320s, two A321s, four Xian (XAC) Y-7 turboprops and one XAC MA60.

"We believe this decision will lead Embraer to additional opportunities in China," says Embraer president Mauricio Botelho. Market forecasts predict a demand for 400-500 regional jets in China over the next ten years.

The signing of the LoI coincides with the opening of a commercial representative office in Beijing.

Embraer's sales director for China, Orlando Ferro, tells *Flight International's* sister on-line news service *Air Transport Intelligence* that it is hoping to finalise the contract with Sichuan later this month, allowing deliveries to run from October into early 2001. □



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Oneida plans New York start-up

RAMON LOPEZ/WASHINGTON DC

A WELL-FINANCED start-up carrier aims to move into markets currently dominated by US Airways, offering lower fares, higher frequency and an all-jet service.

Oneida Airlines, with corporate offices in Utica, New York, plans to begin flight operations from Syracuse, New York state in November with five McDonnell Douglas DC-9-30s. According to Stephen Enea, a board member of

the airline, the fleet will double to 10 DC-9s within two months, configured with eight in first-class and 88 economy.

The airline plans to replace the ageing twinjets within a year with new Boeing 717s and 737-700s. Discussions with Boeing and leasing companies are continuing regarding seven 737s and fifteen 717s, but this mix might change, he adds. In addition, Oneida plans to purchase five 44-seat Fairchild 428JETs to serve smaller communities in upstate New York unable

to support larger aircraft.

Aside from Syracuse, Oneida plans initially to serve eight New York cities, including Albany, Buffalo, Rochester, and New York City. Routes to Washington DC and Chicago are also sought. Oneida plans a combination of hub-and-spoke and point-to-point operations. The new airline entrant would add service to Florida destinations next February using 737-700s. In the second full year of operation, service would be expanded to include Pennsylvania

and Ohio locations. The following year, transatlantic services to selected European destinations are planned.

Oneida says it has secured \$180 million private funding from OAL Investment Group, a group of four companies: Internet Solutions Unlimited, an internet design firm; a biotech company and two real estate firms. Enea says Oneida expects to lose \$25 million in its first year, but earn \$24 million (on revenue of \$492 million) the following year. □

Air Zimbabwe to cut routes as crisis hits

AIR ZIMBABWE has curtailed its regional operations in the face of falling demand caused by the country's political unrest and faltering economy.

In a bid to cut costs, it has suspended several routes including Harare-Cape Town and Harare-Durban. Instead, Air Zimbabwe is only operating to Johannesburg in South Africa where its passengers transfer to flights operated by BA franchise carrier, Comair.

The Zimbabwe flag carrier says that all but two of its aircraft are operational, despite the chronic fuel shortage that has crippled Zimbabwe's industry and resulted in day-long queues for petrol, diesel, paraffin and kerosene. A Boeing 737-200 and a British Aerospace 146 are stored.

The airline's two Boeing 767-200ERs continue to operate its longer haul flights, although plans to lease more aircraft are shelved. "We were talking to Chinese carriers last December about leasing either Airbus A340-300 or Boeing 777 aircraft, but this is no longer the case," says the airline.

In line with other international carriers serving Harare, Air Zimbabwe has seen loads plummet as a result of publicity surrounding political unrest in the country. The airline admits that the unrest "has had an impact on us, but we expect our loads to recover to normal after the elections in June". □

Skyservice aims at Canadian void

BRIAN DUNN/MONTREAL

SKYSERVICE AIRLINES has joined the growing list of carriers moving to fill the void left by Canadian Airlines.

The Toronto-based aircraft maintenance, executive aircraft and charter operator plans to create a new full-service airline modelled on Virgin Atlantic, targeting Canadian business travellers. The unnamed airline plans to begin daily services in November between Vancouver, Calgary, Edmonton, Winnipeg, Toronto, Montreal, Ottawa and Halifax. Daily flights to a few key US destinations will also be offered.

The company's business plan calls for its fleet of five Airbus A320s and A330-300s to rise to nine in time for its November launch, and hopes to add another nine before its third year of operations. Negotiations with leasing company Orix are underway. To finance its expansion, the firm has hired Research Capital Group of Toronto, to raise C\$50 million



Skyservice plans to expand its Airbus fleet to cater for domestic growth

(\$34 million) in a new share offering.

Skyservice currently operates its Airbus fleet on charters for various tour operators including Toronto-based Sunquest Vacations and Alba Tours, which are both subsidiaries of the UK's Airtours.

The new airline joins WestJet of Calgary which recently began operating in eastern Canada, CanJet of Halifax, which also announced plans to begin domestic services, while Canada 3000 is to expand and boost services in the Canadian market.

Some analysts are sceptical

about the fledgling airline's ability to lure business travellers away from Star Alliance member Air Canada. "Any airline that takes on Air Canada will not be successful, because business travellers tend not to like airlines that don't offer frequency," says Jacques Kavafian of Yorkton Securities, Toronto.

But Skyservice chairman and chief executive Russell Payson says he is not about to take on Air Canada. "We are targeting the price-sensitive and connecting business traveller from international airlines that are not Star Alliance partners." □

Australia crash raises small carrier safety issue

ALL EIGHT people on board a Whyalla Airlines Piper Chieftain died when it ditched on a 31 May night flight from Adelaide, Australia to Whyalla.

In a mayday call, the pilot reported that both engines had lost power. The accident, the fourth in recent years involving small Australian commuter aircraft, has

revived interest in regulatory surveillance of small carriers. A proposed investigation of Whyalla three years ago was quashed by the authority's board. □

Safety inspections reveal extent of danger airlines

DAVID LEARMOUNT/LONDON

AIRLINERS OPERATING into European airports are often crewed by pilots with invalid licences, have emergency exits blocked by seats and fly with unsecured cargo in the hold, leaking hydraulics and worn-out tyres, according to a report from the European Civil Aviation Conference (ECAC).

The catalogue of faults is among the most frequent serious findings listed in the Safety Assessment of Foreign Aircraft (SAFA) report published for the first time since the 37 ECAC member countries began operating the scheme in 1996. Under the system, aircraft and crews are subject to inspection at European airports if the aviation authorities have reason to believe

that checks may be warranted.

The report, which covers the 1996-98 period, records that 4,569 reports had been filed by the end of 1998 on the scheme's database which is operated by the Joint Aviation Authorities.

At present, however, ECAC and some of the nations participating in SAFA are reluctant to "name and shame" either airlines or states of registration which appear as persistent offenders.

Analysis of the inspections reveals that 58% were carried out on ECAC-registered aircraft, and 42% on those of non-ECAC countries. About 2,500 of the checks revealed no deficiencies, nearly 1,000 discovered one fault, and about 50 aircraft had seven faults or more.

The SAFA report says that "the

more significant deficiencies" found in the flight-deck included non-valid flight-crew licences, the absence of required manuals, or manuals being out of date, and incorrect calculation of load distribution.

In the case of cabin safety, the SAFA inspections reported that the most significant findings related to emergency exits. These included emergency exit path marking "often found partly inoperative" and emergency exits blocked by seats. Leakage of hydraulics, fuel, oil or freight containers, worn-out tyres and inadequately secured cargo were also found. Ultimately, says ECAC, the International Civil Aviation Organisation (ICAO) can be informed if a state persistently offends and can result in an ICAO safety audit. □

MARKETPLACE

++ Cypriot start-up **Helios Airways** has taken delivery of its first aircraft, an ex-Futura Boeing 737-400 leased from **GE Capital Aviation Services**, and launched operations with a charter flight from London Gatwick to Larnaca. **++** **Volga-Dnepr Airlines** has taken delivery of a new Antonov An-124-100 after completion by Avistar in Ulyanovsk. Construction of the An-124, which is Volga's tenth aircraft, was financed through a credit line extended by the Russian state savings bank Sberbank and the airline's own resources. **++** **British Airways** franchise partner **GB Airways** has received its first Airbus A320, an International Aero Engines V2500-powered example leased from **Singapore Aircraft Leasing Enterprise**. Meanwhile, BA's Heathrow-based Mainline division has received its first A319. **++** **Frontier Airlines** has taken delivery of an ex-Air Europa Boeing 737-300 on a 32 month lease from International Lease Finance.

Boeing eyes 747-400 freight conversion market

BOEING AIRPLANE Services (BAS) has begun work on the first 747-300 freighter conversion as it gears up for a launch of a similar modification for the 747-400, possibly by the end of this year.

The 747-300 "special freighter" programme is going ahead on the back of a firm order from Atlas Air for the modification of three -300 combis. Although two stretched upper-deck (SUD) 747-200s were modified to freighters by Boeing for KLM in 1998, this deal is the

first for a genuine 747-300.

There are around 79 747-300s in service, along with 12 -100/200 SUD passenger models. BAS president Joseph Gullion says he sees "a minimum of 50 aircraft being done". He adds the conversion for the -300 is "the next logical step" for current -100F operators wishing to eventually step up to -400F operations. Gullion says that BAS is nearing a launch decision for the 747-400 special freighter conversion and says go-ahead

could come "before year-end".

For the -300, the initial "proof of concept" conversions will be undertaken at Boeing's Wichita site in Kansas, with subsequent modifications mainly being completed by BAS partner sites around the world.

The converted -300s will have a revenue payload of approximately 106,690kg (235,000lb) with an overall cargo volume of 738m³ (26,600ft³). The conversion includes changes to the internal configuration of the extended upper-deck cabin's floor to maximise main-deck cargo height, and strengthened main deck floor beams and panels.

BAS says range with full payload will be 7,770km (4,200nm). A proposed flightdeck upgrade for "Classic" 747s is "not currently slated to happen" with the -300s, adds the cargo airline. The upgrade remains an option in future conversion packages which could eventually cover more than half the current fleet of -300s. □

TWA 800 missile 'shootdown' tested

SEVERAL RAYTHEON Stinger man-portable air defence missiles have been fired from Eglin US air force base to test the officially dismissed theory that a missile caused the 1996 crash of a Trans World Airlines Boeing 747 after it left New York's Kennedy International.

The firings were carried out by the US Army in late April and observed by National Transportation Safety Board (NTSB).

The firings were observed and recorded by investigators checking eyewitness descriptions of TWA Flight 800's end, because the NTSB says it feels that the investigation will be incomplete unless the missile theory can be discounted on scientific evidence.

The tests will help determine whether streaks of light reported that night could have been missiles. Evidence so far, the NTSB says, points to an explosion in the aircraft's centre fuel tank as the cause. □



Atlas will add converted 747-300 freighters to its fleet of -200Fs and -400Fs

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ROUTES

++ Northwest Airlines and **Hawaiian Airlines** have renewed their codesharing agreement, originally signed in 1996, for a further five years. **++ UK-regional Eastern Airways** is to introduce a daily service between Edinburgh and Norwich from 11 June. The takeover of the route coincides with **ScotAirways** withdrawal of the service. **++ Delta Connection** carrier **Atlantic Southeast Airlines** plans services between Dallas Love Field and Atlanta on 1 July using 50-seat Bombardier CRJs. Meanwhile **American Airlines** has reached agreement with Continental Express to continue using its gates at Dallas Love Field, allowing the the US carrier to maintain its full Love Field schedule. **American** continue to press the Dallas City Council for permission to use three former Braniff gates in the east concourse. **++ Swissair** will be operating a second daily Zurich-Boston service beginning 18 June. **++ Varig** begins a second daily Los Angeles-Brazil service from 15 July. **++ US Airways** launched a daily Philadelphia-Manchester, UK service on 25 May. **++ Philippine Airlines** is returning to Australia with the resumption of direct services between Manila and Sydney, using an Airbus A340. **++ Gemini Air Cargo** began Boeing MD-11 freighter services from Detroit's Willow Run Airport on 25 May, on behalf of US charter management company **Pathfinder Air Resources**. **++ UPS** launched a second US-Australia service on 27 May, adding a weekly Boeing 767 freighter flight from Ontario, California to Sydney. **++ Air New Zealand** will offer codeshare services with **Air Canada** to Vancouver and Toronto via Honolulu, and to Vancouver via Los Angeles. **++ Lufthansa** has begun operating a codeshare arrangement with **United Airlines** on its flights between Dubai and Frankfurt. **++ World Airways** will begin twice-weekly Boeing MD-11 services between New York JFK and Tel Aviv on 2 July, on behalf of charter operator **Lambda World**.

Green laws could 'distort' Airbus growth projections

JULIAN MOXON/TOULOUSE

AIRBUS INDUSTRIE has admitted for the first time that its forecasts of air transport growth, crucial to decisions on bringing new aircraft to the market, may be seriously distorted by forthcoming environmental rule-making.

Adam Brown, vice-president for planning and forecasting strategic planning, says proposed action by the European Commission to introduce charges for aviation pollution is "one of the threats to our forecasting and something we're watching very closely". He adds that it is "deeply disturbing to dis-

cover some of the plots being hatched in Brussels when our industry has achieved so much in reducing pollution".

The Commission has already presented plans for a new tax on aviation kerosene, condemned as "pointless" by the Association of European Airlines and is working on proposals for pollution credit trading, under which the air transport industry would have to pay for being able to continue using kerosene as other modes of transport changed to less polluting fuels.

Such measures "will have a very negative impact - the cost of travel will go up", says Brown, who has based forecasts to date on con-

tinued reduction in air fares as the industry deregulates further and the yet to be launched 550-seat A3XX enters service as planned in 2005.

He adds that Airbus and the air transport industry in general "have a huge job to do", to convince Brussels and environmental organisations such as Friends of the Earth - which recently attacked aviation's effect on the upper atmosphere - of its good environmental record.

Brown also points to the continuing failure to develop airport and air traffic control infrastructure as another "vulnerable point" in current predictions of growth. □

Virgin Atlantic upgrades Athens service with introduction of A321



Virgin Atlantic has upgraded its London-Athens service by replacing the Airbus A320 used on the route with the larger A321. The new CFM International CFM56-powered aircraft has been delivered on lease from GE Capital Aviation Services, and is operating the twice-daily service which runs from Heathrow.

American shuns deal with El Al

AMERICAN AIRLINES has snubbed a proposed codeshare deal with El Al and decided to launch its own direct services to Israel.

The decision to seek clearance to begin flights from New York to Tel Aviv in September surprised El Al, which has been in lengthy negotiations with the US airline over a codeshare agreement. "There was no sign that they wanted to fly to Israel. We will have to decide what to do now," said a senior El Al source.

Talks between the two have been going on for the past five years, and recently there were signs that they

would result in an agreement to co-operate in New York and Chicago.

According to the El Al source, American's decision to go it alone will force the termination of El Al's Chicago services, as "continuation can only be justified with an American codeshare. Now we will have to re-assess it."

Sources in Israel say that American's rethink follows an updated assessment showing that the route could generate mainly high yield traffic. Continental has also had a good response to its daily New York Newark to Tel Aviv flights and will add a second daily rotation next month. □

Moscow guarantees loan for Tu-204


RUSSIA'S prime minister Mikhail Kasyanov is expected shortly to sign a government order issuing state guarantees against a \$110 million bank loan covering the production of 10 Tupolev Tu-204s by Aviastar at Ulyanovsk.

Government-owned Vnesheconombank will finance the production, which will become a pilot project for a leasing scheme for Russia's aircraft industry.

Moscow-based Transaero will take the 10 Tu-204s on lease, with the first three aircraft due for delivery this year, and the remainder following in 2001/2002. □



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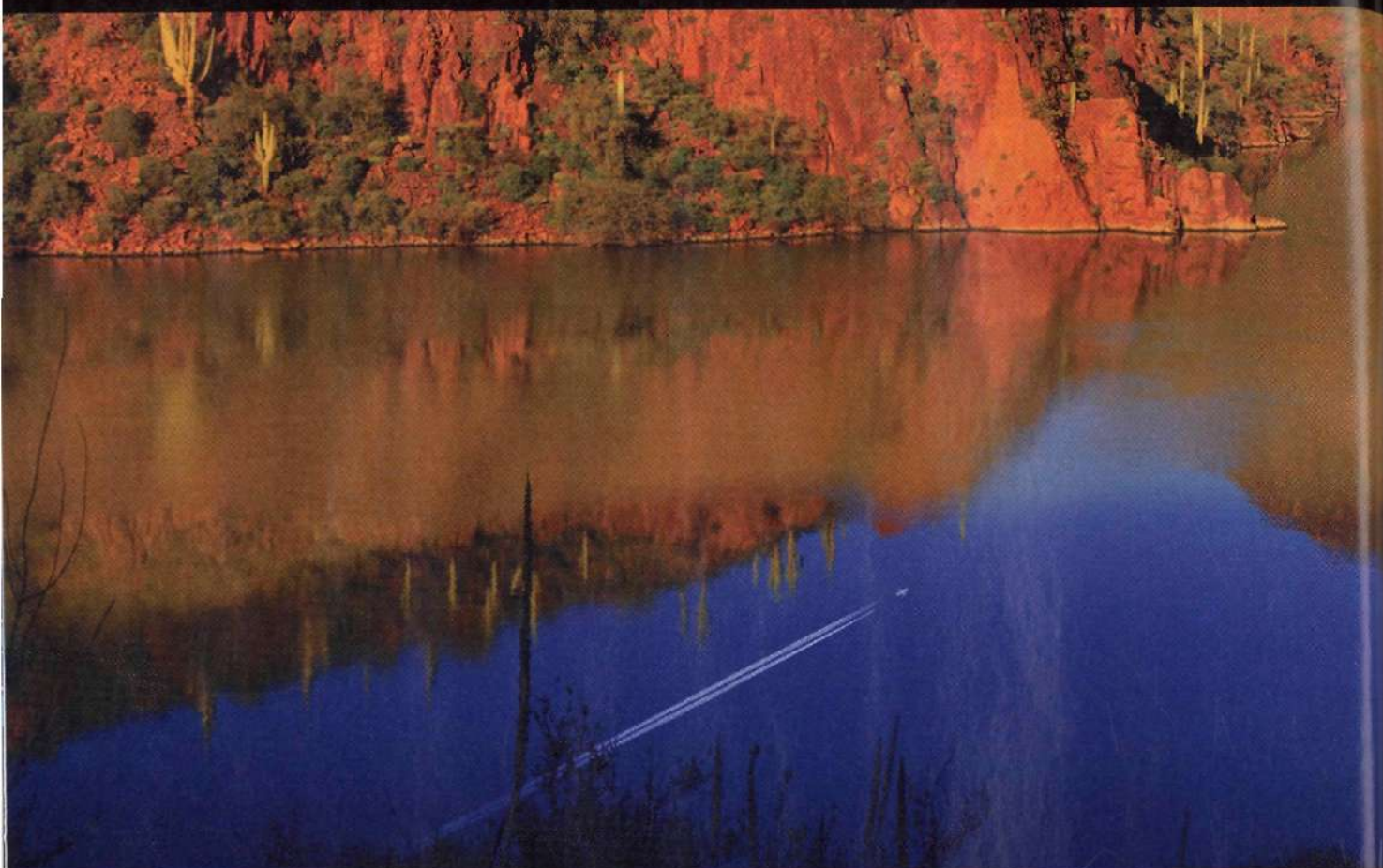
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Delta and Air France gear up for 'new-look' alliance

CHRIS JASPER/ATLANTA

DELTA AIR Lines and Air France have chosen a name for their global alliance, which the US carrier says will be launched "within a couple of months". Delta will not reveal details of the branding, but director of alliances Brent Conwell says it will mark a departure from the rival "Star" and "oneworld" tags in that it will seek to market the alliance, as well as giving it an identity.

Conwell indicates that Delta and Air France will establish the grouping along with allies Aeromexico and Korean Air, but hints that a further member could be recruited prior to launch. He adds that though KAL is likely to be on board from day one, the Asian car-

rier is still working to improve its safety record and that full code-sharing is unlikely before next year. KAL currently places passengers on Delta flights, but the US major does not reciprocate.

Conwell says the new alliance will aim to have "no more than eight or ten core members", suggesting that focus can be lost with more. He adds that the alliance "has a definite interest" in Thai International, which, though a Star member, is to be privatised in the medium term and could switch camp when seeking an investor.

The new group's Asian presence, built around the development of South Korea's new Incheon airport as a major hub, could be boosted by the recruitment of China Southern Airlines, China's largest carrier and

a Delta ally, which Conwell sees as "a good long-term prospect".

Conwell says prospects for expanding the alliance's third big hub at Paris Charles de Gaulle will give it "massive" strength in Europe but he would like to expand to London Heathrow. Delta now flies only to London Gatwick, and a US-UK deal giving it access to Heathrow is a key goal for the alliance.

Other airlines within the Delta-Air France orbit include Russia's Aeroflot, with which the French major is negotiating. The group's Latin American coverage south of the Caribbean is to be improved by expanding Delta's own network, with the carrier aiming to become the third largest US presence in the continent, after American Airlines and Continental Airlines. □

WORKSHOP

++ Hawker Pacific Aerospace has signed a six-year, \$8.5 million contract to provide Fairchild 328JET brake overhaul services for **Atlantic Coast Airlines** and **ACJet**. **++ Messier Services** is to provide a network of wheel and brake services in North and South America. **++ Guangzhou Aircraft Maintenance Engineering Company (GAMECO)** has been contracted by **Atlas Air** to provide support at Shenzhen, China, for its Boeing 747-400 freighter wet-leased for **China Southern Airlines**. **++ American Air carriers** Support subsidiary **AAS Aircraft Services** will perform C-check heavy maintenance and modification work on a **Spirit Airlines** Boeing MD-82 at its Fort Sill, South Carolina, facility. **++ Sharjah, United Arab Emirates-based Gulf Falcon** has selected **Dunlop Aviation Services (DAS)** to provide brake overhaul and maintenance services for its six Boeing 747s. **++ Woodward Governor** has signed a 10-year repair services agreement covering the engine fuel flow governors on **American Airlines'** Rolls-Royce RB211-powered Boeing 757s. Woodward will be paid for every hour a 757 flies and, in return, will maintain and overhaul the governors at a fixed material and labour rate. **++ FLS Aerospace** is to undertake heavy maintenance on an **Air Malta** Boeing 737-200 at Stansted Airport, London. **++ Sogerma** has secured a deal with **Air France** to fit out the cabins of 19 A340s. Work begins in August.

FlyEuropean begins low fare service for Swedish domestic market



FLYEUROPEAN, a Swedish low fare start-up formed by European Aviation of the UK, began operations last month on services between Stockholm and Malmö. The airline is initially operating twice-daily round trips between Stockholm Skavsta and Malmö Sturup airports, using two 100-seat BAC One-Eleven 500s. Introductory return fares start from SKr350 (\$39) plus taxes.

Burbank restarts 707 hushkit line as business finally picks up

BURBANK Aeronautical (BAC) is restarting its Boeing 707 hushkit line after almost a year's suspension due to market uncertainty over the impact of European Union (EU) regulations on operations of aircraft modified with hushkits for Stage 3 compliance.

"We stopped deliveries last year, even though we had got certification for the 707-300 in November 1998" says BAC marketing director, Tom McGuire. "We had air-

craft lined up, but because of the EU situation everyone backed out, so we froze the production line."

"We have now opened the doors again for the 707, and are completing work on a second aircraft. We will soon have a couple of freighters lined up", McGuire says new business for the 707 hushkit is coming from Latin America, with more expected from the Middle East. However, BAC admits that the EU debate has dampened the overall

potential 707 conversion market down to "below 50".

BAC plans to start flight tests of the DC-8-50/61 hushkit this month, and hopes to achieve supplemental type certification (STC) by September. The kit is 80% common with the 707 kit. The market for the DC-8-50/61 is estimated at around 45 aircraft, says McGuire who says almost all the candidate aircraft are based in the USA.

BAC also plans to restart certi-

fication work on winglet modification around July, initially for the 707, with the STC expected around October, says McGuire. The firm has completed work on a "lightweight" Stage 3 modification for the 707-100 series. The package includes flap setting changes and modifications to operating procedures "similar to Raisbeck" says BAC. The modification was completed on a 707-138 owned by actor John Travolta. □

Dragonair heads for Hong Kong cargo showdown

ANDRZEJ JEZIORSKI/SINGAPORE

HONG KONG'S Dragonair will compete for the first time with Cathay Pacific and Air Hong Kong on intercontinental cargo routes when it launches services to Europe in July.

The Hong Kong air transport licensing authority has approved the Dragonair application to operate all-cargo services from Hong Kong to Amsterdam and Manchester. Hong Kong Government approval for the routes, which will be operated via Dubai, is pending.

Atlas Air will fly the services with a Boeing 747-200 freighter under a wet-lease agreement. Dragonair is expected to purchase the 747 even-

tually, and says it is considering building up its freighter fleet to five aircraft within three to five years.

The airline has also applied for approval to operate cargo services to destinations in North America, Japan and North-East and South-East Asia. Until now, Dragonair's network has predominantly served mainland China, where rival Cathay does not operate. Cathay has a small shareholding in its local rival, which has been reduced from a 43% stake since handover to China.

The company says it has been "looking at entering the [dedicated] freighter market for some time based on the growth potential of the cargo market and the excellent performance of existing cargo

operations. The application for licences is another step in this process. As with any airline, we do not expect to fly to all the points to which we hold a licence."

One Dragonair source says that the airline will be "competing with Cathay Pacific and its subsidiary Air Hong Kong on these routes". Up to now, competition between the carriers has been ruled out by a government-imposed "one-airline, one route" policy, which the source says is "getting more liberalised".

Cathay's cargo arm operates a fleet of four 747-200 freighters and two -400Fs (plus two on order) on its worldwide cargo network, while Air Hong Kong has three 747-200Fs. □

NEWS IN BRIEF

LAHSO HEADED OFF

Confrontation between US airline pilots and the US Federal Aviation Administration was avoided last week when the FAA agreed to postpone rule changes on land and hold short operations (LAHSO) that the flight deck crews say are not safe (*Flight International* 23-29 May).

NOISE CHARGE VALIDATED

A case calling for a ban on night flying at London Heathrow was ruled admissible by the European Court of Human Rights, which has said that it will go ahead with a hearing on the issue (*Flight International*, 16-22 May, P11). Campaigning group HACAN ClearSkies, which brought the case, says it is "confident that the merits of our case will be recognised".

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Eurocontrol on track for RVSM by 2002

JULIAN MOXON/PARIS

EUROCONTROL TESTED the operation of its reduced vertical separation minima (RVSM) programme successfully for the first time on 25 May. It says it is on track for full introduction on 24 January 2002.

Two flights were monitored using height and global positioning system (GPS) monitoring units. A Britannia Airways Boeing 757 flying from Paphos, Greece, to London Gatwick was formally height-monitored from a unit in Linz, Austria.

A further two height-measuring units have been located at Nattenheim, Germany and Geneva, Switzerland, and will enter operation in September and October respectively. A Boeing 737 operated by British Airways subsidiary Go was monitored using an on-board GPS, one of 25 portable airborne units that will contribute

data needed to establish the precision of RVSM. It will reduce vertical separation to 1,000ft (305 m) between flight levels 290 and 410.

Aircraft operators will have to meet RVSM minimum aircraft system performance specifications by 31 December to comply with Eurocontrol's 31 March 2001 target-date for approval to fly in RVSM airspace. The agency says this is to ensure that enough aircraft are RVSM-equipped to develop a safety case for the go-ahead decision in September 2001. It also wants some idea of the number of non-RVSM-equipped aircraft there are likely to be so it can predict possible congestion in non-RVSM airspace.

Eurocontrol says that to meet requirements, aircraft "will have to demonstrate 250ft altimetry accuracy in a 3,330ft separation environment". Larger deviations "will be investigated by the certification authority and the operator". □

In three separate travel surveys*, 89% or more of business travellers said they prefer to fly long haul in a configuration without a middle seat. Because they are less likely to be disturbed by their neighbour, passengers find it easier to sleep when they are comfortably seated in pairs. Which may explain why, in 1999, the A330/A340 family outsold the 777 family by a factor of three to one. In business, two seats will always be more popular than three. As surely as night follows day.

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USA 'punishes' Israel AEW deal with China

THE US Government is stepping up pressure on the Israeli Government to cancel a contract to supply airborne early warning (AEW) systems to China by unofficially slowing down the approval procedures between Washington and Tel Aviv for a variety of defence-related programmes, claim Israeli sources.

"The sanctions are not official but suddenly everything is by the book. We feel that they have decided to teach us a lesson," a senior Israeli industry source says.

The Israeli Government has been under heavy pressure to withdraw from an agreement to supply Elta Phalcon AEW systems to China. The latter has a requirement for a total of four AEW systems worth around \$1 billion, although an existing contract covers only one platform.

The measures are said to have affected the approval of joint research and development programmes and export licenses for Israeli-built weapon systems with US content. "We asked in Washington but everybody denied it. In everyday practice it looks like a very well orchestrated offensive" says the source.

Israel Aircraft Industries is test flying the first Russian-built Beriev A-50 (modified Ilyushin Il-76) while Elta – an IAI subsidiary – continues to equip the aircraft with Phalcon. □

Boeing begins vital tests of Block 3 software in F-22



Testing of crucial F-22 Block 3 sensor fusion software has started

GRAHAM WARWICK/WASHINGTON DC

BOEING HAS BEGUN laboratory testing critical software for the Lockheed Martin-led F-22 Raptor. The Block 3.0 sensor-fusion software must fly in an F-22 before the end of the year for the fighter programme to receive production funding.

Testing began on schedule in late May, in Boeing's avionics integration laboratory. The Block 3.0 software is planned for release to Boeing's 757 flying testbed in August and delivery to Lockheed Martin in early November.

Flight testing in the F-22 is scheduled to begin in mid-Nov-

ember, ahead of a Defense Acquisition Board meeting planned for mid-December, to decide whether to approve low-rate initial production of the fighter.

Lockheed Martin and Boeing remain confident of meeting the deadline, but it will be a "challenge", says programme general manager Bob Rearden. A subset of the Block 3.0 software, called 3S, has been flying on the 757 since April, to reduce risk.

Block 3S comprises 1.35 million of the 1.7 million lines of code in 3.0, Rearden says, but lacks the sensor fusion capability. "It allows us to look at the sensors independently before we combine them," he

adds. Block 3.0 will fuse data from the F-22's radar, communication/navigation/identification and electronic warfare systems.

The fourth F-22 will require modification before Block 3.0 flight testing can begin. Aircraft 4004 is to fly in late June/early July, and will then be grounded in October for installation of new cockpit displays before returning to flight in mid-November with Block 3.0 software installed. The new Kaiser displays "worked first time" in the cockpit integration laboratory, Rearden says.

The team is already developing the next block of software, 3.1, which will be installed in the F-22 at its initial operational capability (IOC) in 2005. This includes full sensor and navigation fusion, as well as secure communications and intra-flight datalink.

Definition is under way of a Block 4 software upgrade which will introduce the Joint Helmet-Mounted Cueing System and AIM-9X air-to-air missile. This could be installed by IOC, Rearden says. Work has also begun on a Block 5 upgrade which would expand the F-22's air-to-ground capability. This could be incorporated as early as 2006. □

NEWS IN BRIEF

■ INDIAN MI-17 ORDER

Aviaexport and Promexport have signed contracts with the Indian Government to supply 40 Mil Mi-17-1V transport/assault helicopters in a \$170 million deal. Aviaexport is the prime contractor. Promexport, a specialised arms sales agency, will be responsible for arming the helicopters with machine guns and air-to-ground weapons. The Mi-17-1V is produced by the Kazan Helicopter Plant. The Indian air force operates 50 earlier versions of the Mi-17s.

GAO questions F/A-18E/F multi-year purchase

US CONGRESS IS being pressed to withhold approval for multi-year procurement of the Boeing F/A-18E/F Super Hornet until solutions are found to noise and vibration problems which can damage weapons carried by the fighter. The US Navy plans to sign a cost-saving five-year contract for 222 aircraft later this month.

The US General Accounting Office (GAO) recommends that Congress directs the navy to defer signing the contract until the problems are corrected. The US Department of Defense (DoD) says noise and vibration are being addressed and the problems are encountered with other tactical aircraft.

"The F/A-18E/F is ready for full-rate production," the DoD says in its rebuttal of the GAO report.

Existence of a severe underlying noise and vibration environment has been known since 1997, and several stores have experienced cracking of fins and support structure. As a result, the GAO says, during operational evaluation of the F/A-18E/F last year, a 50h service life limit was imposed on the AIM-120 AMRAAM air-to-air missile, compared with 450h on the current F/A-18C/D. More fre-

quent inspections for damage were also required.

The DoD says that, despite this deficiency, independent testers still found the F/A-18E/F to be operationally effective and suitable and ready for fleet introduction. The DoD says a panel of independent experts has concluded that no wing redesign is required. Instead, the navy may strengthen the weapons. ■ The US Navy has completed the first flight release of the Joint Direct Attack Munitions (JDAM) from the Super Hornet as it begins clearing the latest US smart weapons on the aircraft. □

UK/US close to JSF agreement

PAUL LEWIS/WASHINGTON DC

THE US Joint Strike Fighter (JSF) programme office expects to reach agreement with the UK this month on participation in the programme's engineering manufacturing and development (EMD) phase, while talks begin with Turkey next month on an expanded partnership.

JSF international programme director John Schreiber anticipates concluding a deal with the UK at the end of a fifth round of talks this month. "We'll both start national staffing with the intent of signing a MoU [memorandum of understanding] by September."

Only the UK is being offered full 'level one' EMD participation in return for funding 10% of the projected \$18 billion development cost.

September will mark the start of evaluation of the two JSF contenders, by which stage the UK is expected to have concluded its Future Carrier Borne Aircraft study.

"The UK needs to sign the MoU before we release the CFI [call for improvements] to our contenders in September. In order for the UK to participate in the source selection process they need to sign the MoU with us by then," says Schreiber.

Turkey has indicated to the pro-

gramme office that it wants to be elevated to 'level two' partnership and take a 5% EMD stake. It is a fourth-tier foreign military sales (FMS) player in the current concept demonstration phase (CDP), but has invested over \$6 million in 'fee for service' data and a US brokered industry day.

US defence undersecretary Jacques Gansler recently extended invitations to Turkey, as well as Australia and Belgium, to join the next phase. "They have not officially sent back a letter, but we're in the process of setting up a negotiating schedule for them. They want to participate at level two," reveals Schreiber. Australia

and Belgium have declined to join the EMD phase.

Earlier invitations were sent to all CDP tier two 'associate' and tier three 'informed' partners. The Netherlands is to hold a second round of talks this month on becoming a level two partner, while discussions will start soon with Italy on taking a 5% EMD share.

Canada, Denmark and Norway want to participate as level three partners with a 1-2% EMD share.

The next phase will also be open to FMS participants in return for a minimum \$75 million outlay. Invitations will be sent shortly to around another 12 potential partner nations. □

Eurofighter passes key review as new software is prepared for flight



Eurofighter DA2 is to fly software with functionality close to IOC standard

STEWART PENNEY/MUNICH

EUROFIGHTER IS on the verge of flying revised flight control and avionics software shortly after clearing a crucial programme review by the four-nation management agency NETMA.

Luis Munoz, Eurofighter development phase director, says flight control software (FCS) 2B/2 was cleared for flight in late May and will fly on Eurofighter DA2 at BAE System's Warton site by mid-June. The aircraft will also fly with

revised avionics - (3B/1 and 3B/2) and utility control software 3B/3. Munoz says these software releases have most of the functionality of the initial operational capability (IOC) standard, set to fly early next year. "IOC is just a small increment away from these standards," says Munoz. Avionics software 3B2 is due to be cleared in November with the IOC standard 3C in December. IOC-standard FCS software is set for a January delivery.

Flying IOC-standard software early next year is crucial if

Eurofighter production delivery schedules are to be met.

Final assembly of the first of five instrumented production aircraft (IPA) is to begin at Warton in early September, with its maiden flight scheduled for August next year.

Eurofighter managing director Bob Haslam says passing the annual on-going programme review (OPR), which took place in late May, is "encouraging" as the process is "fundamental to achieve customer confidence". OPR could have resulted in delays to the programme as it offers Eurofighter and NETMA the opportunity to slip timescales.

Haslam says NETMA has accepted an offer to hold a similar review later this year, probably in late September. The consortium made the offer, he says, as, by then, IPA production will have started, major sub-assemblies will be arriving at the final assembly centres and IOC software will be in rig test.

Meanwhile final contract discussions with Greece for 60-90 Eurofighters started at the end of May. Talks are planned to last until the second week of July, with contract signature shortly thereafter. □

Thai F-16s will be AMRAAM-capable

THE ROYAL Thai Air Force has signed an agreement with the US Government to buy 18 used Lockheed Martin F-16A/Bs.

The deal, worth about \$133 million, is awaiting final approval from the Thai cabinet.

The USA confirms that the aircraft will be "AMRAAM-capable", but no missiles are included in the deal, which was approved by the US Congress in January. There is no on-going process to approve Raytheon AIM-120 AMRAAM deliveries to Thailand, but embassy officials in Bangkok say that this could change quickly in a crisis. Singapore has been offered a similar arrangement for the AIM-120.

If the Thai cabinet approves the purchase by 28 June, reconditioning work on the aircraft could be included in a continuing US F-16 upgrade programme, allowing the aircraft to be delivered in two years.

Thailand is expected to pay \$35 million of the F-16 cost in Boeing F/A-18 spares which were bought as part of a cancelled procurement. The supply of AMRAAM was a key element of the F/A-18 deal.

The aircraft destined for the Thai air force are understood to have flown between 2,000h and 3,000h, giving them a remaining service life of about 20 years. □

Spain arms AV-8B with Penguin

PAUL LEWIS/PATUXENT RIVER

THE SPANISH navy is looking to arm the Boeing AV-8B Harrier II Plus with the Kongsberg Penguin anti-ship missile (ASM), after completing Raytheon AIM-120 AMRAAM envelope expansion flight tests.

Subject to funding, the navy plans to order the Norwegian ASM for the Harrier and Sikorsky SH-60B Seahawk helicopter as an offset for Oslo purchasing Spanish built frigates.

Originally Spain, along with Italy, wanted to integrate the Boeing AGM-84 Harpoon with the Harrier but failed to get US Marine Corps funding support. The missile was also deemed too heavy. The Italian navy is believed to be looking at the Alenia Marconi Systems Marte Mk2 for its 16 AV-8Bs.

The two countries have just completed a jointly funded effort to expand the AV-8B's AMRAAM carriage envelope from an initial +3g/-1g limit. "We're not very happy with that and we decided to



The AV-8B can now carry four AMRAAMs throughout the envelope

increase the envelope of the weapon to make it similar to the [Raytheon] AIM-9," says a Spanish AV-8B programme official.

Flight testing at the US Navy's China Lake facility has been completed and data is now being

analysed to confirm a +7g/-3g envelope. The Italian and Spanish aircraft will be able to carry four AMRAAMs on the two inboard and two intermediate wing hard-points.

Missile firing trials and an initial

operating capability are having to wait for the completion of the Harrier II's ongoing Open System Core Avionics Requirement (OSCAR) upgrade due in late 2001. The tripartite OSCAR programme, which includes USMC funding, focuses on new high mission and weapon management computers using high order language software.

Work has just started to integrate the Rafael Litening II targeting and navigation pod with Italian and Spanish USMC Harriers. The pod will be fitted to the aircraft's inboard pylon. The Spanish and Italian navies plan to receive initial systems next April.

In the meantime, the AV-8B Plus remanufacturing line faces a production gap unless new orders can be secured by July. Spain will take delivery of the final two aircraft in June and July 2003 unless funds can be found to upgrade its remaining seven AV-8Bs. The US Congress is considering funding four more conversions in addition to the 72 ordered. □

Germany hints at A400M choice

GERMAN DEFENCE minister Rudolf Scharping has hinted that Germany will join Belgium, France, Italy, Spain, Turkey and the UK in opting to buy the Airbus Military Company A400M transport.

In an interview with *Focus* magazine, Scharping said it is important to give "absolute priority to a European solution", and praised the UK's recent decision to select the Airbus product. The country is also evaluating a Westernised version of the Antonov An-70 being offered by the Airtruck consortium, and a formal decision is expected before the parliamentary recess in early July. Scharping's comments prompted Airtruck to seek assurances from the defence ministry that it should still spend money participating in the competition, say industry sources. □

'National' team chosen to boost Advanced EHF

LOCKHEED MARTIN, Hughes Space and Communications and TRW have formed a single "national" team to accelerate fielding of the Advanced Extremely High Frequency (EHF) system, follow-on to the US Department of Defense's (DoD) Milstar military communications satellite network.

To reduce the gap in secure communications coverage caused by the loss of the third Milstar in a launch failure last year, the DoD and Congress have agreed to scrap the competition now under way and award the Advanced EHF contract to a single combined team. Previously, Hughes was competing against a Lockheed Martin/TRW team for the five-satellite, \$2.5-3 billion contract.

Lockheed Martin will be prime contractor for the Advanced EHF, which will provide 10 times the communications capacity of the Milstar II satellites. All three companies worked together under Lockheed Martin's leadership on the Milstar programme.

Creation of the national team and elimination of the competition is expected to accelerate development of the Milstar replacement by 18 months. Production is planned to begin in April next year, with the first Advanced EHF launch now due in late 2004.

The decision to form a national team was taken after alternatives had been considered, including a proposal to build a replacement Milstar from components used for ground testing. □

Israel's navy selects maritime King Air

THE ISRAELI navy will replace its Israel Aircraft Industries 1124 Westwind/Sea Scan maritime patrol aircraft with Raytheon Beech King Air B200s.

The navy has been operating three Westwind executive jets that were modified to intercept guerrilla attacks from the sea since 1977.

The armed, radar-equipped Sea Scans have become expensive to operate, and will be replaced with five King Airs, equipped with Elta search radar and other sensors. An Elta radar, with improved capability to filter the sea clutter, was recently tested on a Sea Scan. Last year, the air force chose the King Air to replace electronic warfare Douglas DC-3's.

The air force has operated them since 1991 but will purchase at least another 10. Navy King Airs will operate within the air force unit, to take advantage of commonality. □

US Army evaluates bids for Apache targeting system

PAUL LEWIS/WASHINGTON DC

COMPETITION between Lockheed Martin and Raytheon to equip Boeing AH-64A/D attack helicopters with a second generation targeting and navigation system is increasing with the submission of bids to the US Army and growing international interest.

The US Army is evaluating two new proposals to upgrade the AH-64's target acquisition designation and pilot night vision systems (TADS/PNVS). The bids cover the retrofit of 743 forward looking infrared (FLIR) systems and life cycle costs for up to 25 years.

"The army is looking to upgrade not just the performance but reliability and maintainability from a cost standpoint," says Dave Shrum, Lockheed Martin TADS/PNVS programme manager. The company is proposing Arrowhead, derived from the Boeing/Sikorsky RAH-66 electro-optical system.

Raytheon has proposed FIRE-Sight, a development of a second generation FLIR programme. The navigation system has been flight demonstrated on the Apache as part of the army's Rotorcraft Pilot Associate trials, while the targeting sensor has completed 35h of separate flight tests.

Both companies are beginning to focus beyond the US Army's anticipated July selection and, irrespective of the outcome, have indicated they will continue to develop their systems privately. The systems are projected to cost \$100-120 million to develop.

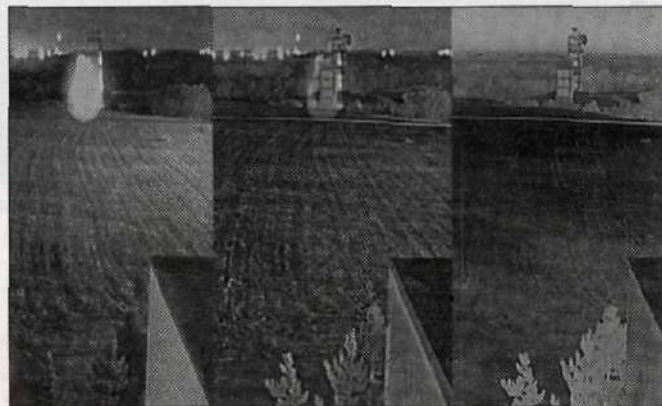
"Any new FLIR sales will be of a second generation system and there is an emerging market, especially in the Asia Pacific region," says Bruce Versteegh, Raytheon programme manager.

Singapore's contract for eight AH-64Ds includes a "not to exceed price" option to upgrade the TADS/PNVS.

Australia, Japan and South Korea are evaluating the AH-64, while the UK has been briefed on Arrowhead and FIRE-Sight as a possible retrofit for its WAH-64D Apache Longbows.

As the US Army is undecided on whether to upgrade all of its AH-64s to Longbow standard, Lockheed Martin and Raytheon proposals include provisions to upgrade AH-64As and AH-64Ds.

The second generation systems include fusion of FLIR and image intensified TV images, two colour laser designator and an expanded 30x52° field of view. □



A fused FIRE-Sight image with the TV image (left) and FLIR picture (right)

PW545 being tested for high altitude UAV role

PRATT & Whitney Canada (P&WC) has revealed details of previously confidential work with NASA's Glenn Research Center on high altitude performance tests of a PW545 turbofan for possible development as an unmanned air vehicle (UAV) powerplant.

"We think we should get into the UAV market, so we are working closely with NASA to test the PW545," says PW500 series senior programme manager Maurice Weinberg. The objectives are to evaluate a commercial off-the-shelf, small high-bypass turbo-

fan at altitudes up to 65,000ft (19,800m), investigate performance and operability under the range of conditions, and define a production UAV configuration.

The first phase of the programme – which complements a broader Pratt & Whitney initiative with Teledyne to enter the UAV market (*Flight International* 16-22 May) – was undertaken last year. With minimal modifications made only to the fuel control unit, a baseline PW545 engine was tested from 50,000ft to 65,000ft and M0.5 to M0.8. It also included a test at 70,000ft and M0.8.

P&WC says the engine performed well at high altitudes. "Before we ran it out with NASA, we flew it up to 45,000ft on our Boeing 720 testbed to see how it would operate up there. In the tests up to 70,000ft [made in a NASA test chamber], the thing didn't even burp," says Weinberg.

The next phase will test an optimised configuration. "We will look at how it works with more loads, as well as things like inlet distortion. It will include measurements of low Reynolds numbers and will be data we've never had before," he says. □

CONTRACTS

South Korea has selected **Pratt & Whitney** F100-229 engines for 20 more licence-built Lockheed Martin F-16s. The engines will be built by Samsung Techwin and are similar to the powerplants in South Korea's other F-16s. ++

Saudi Arabia has awarded **Raytheon** a \$300 million contract to support Hawk and Patriot surface-to-air missiles to December 2002. ++

Ericsson Saab Avionics is to supply electronic control units for 140 **Swedish air force** JAS39 Gripen fighters, in a deal worth SEK55 million (\$6.1 million). ++

Northrop Grumman Integrated Systems and Aerostructures have won a \$3.2 million contract to continue designing an improved wing for the T-38 Talon advanced trainer that could double the type's structural life. ++ US Congress has been notified of the proposed \$305 million sale of 560 AIM-120 AMRAAM air-to-air missiles and 750 BLU-109 bombs to **Greece**. ++

Lockheed Martin has reached agreement with Stork-owned **Fokker** to participate in the next engineering manufacturing phase of the JSF programme. Fokker Aerostructures, Fokker Special Products and Fokker Elmo will supply four work packages comprising assignment of air vehicle advanced design and airframe certification specialists to the systems engineering integration team and design development and production of utility doors and wire harnesses. ++

Raytheon has received a \$183 million multiyear procurement contract to deliver 45 Block 1 Rolling Airframe Missile launch systems over five years, to provide anti-ship missile defense on US Navy warships. ++ **Northrop Grumman Electronic Sensors and Systems Sector** has won a \$99 million contract from the **US Air Force Space and Missile Center** to support 13 mission sensors for the Defense Meteorological Satellite Programme. ++ **Argo-Tech** is to supply 14 components for the fuel system for 94 Korean Aerospace Industries/Lockheed Martin T/A-50 advanced trainer/light attack aircraft.

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Japanese carriers improve profits, but ANA feels costs

ANDRZEJ JEZIORSKI/SINGAPORE

JAPAN'S TWO largest carriers enjoyed improved financial fortunes last year. Flag-carrier Japan Airlines (JAL) reported a 26% increase in air transport-derived operating profits to ¥32.7 billion (\$300 million) in the 12 months to 31 March, and All Nippon Airways (ANA) reported a figure of ¥36.5 billion, compared with the previous year's ¥25.6 billion.

ANA had major restructuring costs to absorb, producing a ¥15.2 billion group net loss, three times as bad as the previous year's ¥4.73 billion. JAL's net result also suffered, profit falling 26% to ¥19.74 billion, although this was "due mainly to a decrease in non-operating revenue", the airline says.

JAL's group operating profit – include non-airline hotel, resort and package holiday businesses – leapt 37% to ¥44.8 billion, and ANA's to ¥31.55 billion, reversing the previous year's loss.

JAL's turnover rose 2% to ¥1.59 trillion (a 5% rise in fuel costs producing a slight rise in operating expenses to ¥1.55 trillion), with the ANA figure up 12% to ¥1.2 trillion. Turnover at Japan Air System, the country's number-three carrier, was ¥390 billion, up 17%, while group operating profit surged to ¥9.57 billion from ¥1.15 billion.

JAL's performance reflected firm international demand, "particularly on Asian routes", and the more "gradual recovery of Japan's domestic economy", it says. Route transfers to low-cost subsidiary

JAL Express, plus fare cuts, were also factors, although falling yields – due largely to poor premium-end demand – remained a problem.

ANA has proposed company-wide wage cuts as the antidote to its losses, despite the fact that one-off costs were essentially to blame. ANA says the 3-6% cuts, to be taken in the period to March 2003, would deliver ¥4.3 billion savings a year, or ¥10 billion in total. Board members have already taken big cuts.

Aviation accounts for 70% of ANA sales, and the airline reports "revived demand and a stabilisation of yields" from the second half. Airline revenue rose 2% to ¥980.5 billion. It foresees group sales of ¥1.22 trillion and a ¥16 billion net profit this year. □

Economy drive at CityLine

SINGLE-CLASS Lufthansa CityLine is to introduce separate economy and business cabins on its aircraft from 1 July in response to a surge in leisure traffic. Three-quarters of CityLine's passengers travel on economy tickets, but enjoy the airline's full "City" (business) class service, including meals.

Introduction of Lufthansa mainline's economy class will see meals cease, with inflight service for business passengers improved. The move marks the failure of CityLine's potentially lucrative business-only model, business passengers falling to 26% of last year's 4.9 million total, from 43% in 1996.

CityLine managing director Karl-Heinz Köpfle nevertheless claims the switch was driven by business demand for "a more exclusive service" and "clear class differentiation", and by the need to move in line with Lufthansa's own dual-class product, so as to offer "uniform quality", as well as stiff competition from Alitalia, Finnair, Iberia, KLM, LOT and Swissair, all of whom are two-class.

The two-class cabins will be introduced on the airline's 36 Bombardier Canadair Regional Jets and 18 BAE Systems Avro RJ85s, while talks are underway with Team Lufthansa franchise carriers (which also offer single-class service) on a similar transformation. □

Staff strike over threat from Bolivian start-up

MARIO FONSECA/RIO DE JANEIRO

THE LAUNCH of a new Bolivian carrier by Brazil's TAM (Transporte Aéreo Mercosur) has led to turmoil within the smaller nation's airline sector. Staff at flag-carrier LAB (Lloyd Aéreo Boliviano) – controlled by TAM's Brazilian rival VASP – are taking industrial action over the threat they believe it poses to existing airlines.

TAM-Bolivia was granted a 180-day operating permit by the government on 7 April, and the airline is poised to launch services using two Fokker 100s. Nearly 2,600 pilots, cabin crew and ground staff at LAB and other operators responded with a 24-hour strike on 30 May, with LAB pilots threatening indefinite action.

Bolivia has 10 scheduled and non-scheduled carriers in addition to LAB, and though all oppose the new entrant, the flag-carrier has most to lose. LAB saw revenues drop 16% in its last fiscal year, and



Debts from parking fees are mounting at LAB

in 1999 its monthly load factor failed to rise above 54%. It also has growing debts relating to aircraft landing and parking fees, and deferred social security payments.

Debts to Colombian airports may see flights to Bogotá halted, but VASP, its 49% owner since 1995, has been unwilling to help because of its own financial problems. Brazilian sources say VASP may even sell its LAB holding,

although Brazil's ambassador to Bolivia denies reports of talks with Lufthansa, and claims VASP may increase its stake should the US FAA ease restrictions on LAB's operations. VASP also manages LAB, allowing it to raid a Boeing 727 and 737 spares cache at Cochabamba (including Pratt & Whitney JT8D engines valued at \$6 million) for use on its own Boeing 727-200F cargo fleet. □

NEWS IN BRIEF

■ KAL RECOGNITION

South Korea has recognised the 1,200 member Korean Air (KAL) Flight Crew Union, heading off a threatened pilot strike. KAL pilots have been barred from forming a union since the 1969 hijacking of an NAMC YS-11 by North Koreans, which led cockpit crew to be armed and afforded "special security", forbidding them trade union membership. Seoul abandoned the policy when faced with a 31 May strike deadline.

CargoLifter's upward flotation with IPO

CARGOLIFTER HAS raised more than \$100 million from its initial public offering (IPO) on the Frankfurt stock exchange, putting the German airship manufacturing start-up on course to fly its prototype 260m-long CL 160 "flying crane" by 2002.

Series production of the helium-filled semi-rigid keel airship, capable of carrying a 160-tonne payload over 10,000km (5,400nm), will begin in 2004.

As well as developing and constructing the airships, CargoLifter plans to operate and market them as a unique platform for transporting heavy, outsized loads that cannot easily be moved using conventional modes of transport.

Cargolifter says the CL 160 – able to deliver its payload direct to the required location – makes "almost no use of existing infrastructure". Chairman Dr Carl von Gablenz says the firm aims "to use this airship as the basis for a new logistics system based on lighter-than-air technology."

A study by the Bremen-based Institute for Shipping, Trade and Logistics forecasts transport volume demand of 3 million tonnes a year, representing a potential requirement of 200 such ships.

Cargolifter plans to build four CL 160s annually from 2004. The German company is consulting with 22 potential "lead" customers for its lift services, including ABB, Hochtief, Linde, Mitsui and Siemens. CargoLifter flew a one-eighth-scale experimental airship for the first time in October last year. □

NEWS IN BRIEF

■ BOMBARDIER EXPANSION

Bombardier Aerospace is spending around £100 million (\$160 million) expanding production at its Northern Ireland subassembly site. The investment, which will create 1,200 jobs, is primarily aimed at raising the production rate of structures for the fast-selling CRJ 100/200 series of regional jets.

Indian Government pushes ahead with Air India sell-off

MEHAR SINGH/DELHI
ANDRZEJ JEZIORSKI/SINGAPORE

THE INDIAN Government has cleared the proposed sale of 60% of Air India, four months after its basic approval for a similar 51% sell-off of Indian Airlines.

According to Air India, the Cabinet's Disinvestment Committee has approved a proposal that 40% of the airline should go to strategic partners, 10% to foreign and domestic institutions and the public, and 10% to employees. The foreign strategic partners holding cannot exceed 26%.

Disinvestment minister Arun Jaitley says that, once a shortlist of potential strategic partners has been prepared, a shareholders'

agreement will be drafted before bids are called in. The agreement will also specify the degree of management control to be granted to the strategic partner.

No schedule has been announced for the privatisation, but the Government is expected to appoint an adviser within 90 days to help it push through the scheme. The same process is underway at Indian Airlines, where a 26% stake is earmarked for strategic partners, with the public, domestic financial institutions and employees being offered the remaining 25%. Foreign airlines are being excluded from the Indian Airlines sell-off.

According to provisional figures, Air India predicts a net loss of

about Rs800 million (\$18 million) in the financial year up to the end of March 2000, compared with a Rs1.74 billion (\$40 million) loss the previous year. Its financial fortunes appear to be on the mend with the airline for the first time in five years declaring an operating profit of Rs.18.6 million in April.

The poor performance of Air India is in sharp contrast to its domestic partner Indian Airlines, which has reported the highest profits in its 46-year history. Outgoing chairman and managing director Anil Bajjal reported a net profit of over Rs 600 million (\$13.5 million) for the year to the end of March 2000, but warned of lower profit figures this year at around Rs260 million. □

THY closes on alliance and sell-off decisions

JULIAN MOXON/ISTANBUL

TURKISH AIRLINES (THY) hopes to reach a decision on membership of a global alliance by the end of the year as the Government moves towards selling a majority stake in the national carrier. THY is not, however, seeking a single large airline investor.

Full privatisation is unlikely to happen by year end, as once planned, says executive vice-president Sertac Haybat, due to financial reversals.

Profits were wiped out last year by the Kosovo crisis and the massive earthquake which hit northern Turkey. "We expect to return to profit this year," he adds.

The government is likely to sell 20-25% of the airline through an initial public offering, but has yet to decide whether to follow up with a further sale to a single large investor. Employees will also be offered shares.

Losses in 1999 stood at L67.5 trillion (\$109 million), compared with a profit of L5.4 trillion in 1998. Revenues last year stood at



THY is looking to replace its A310s, with the A330-100 a possibility

L620 trillion – a 64% increase on 1998. This was more than offset by an 85% increase in costs. Yields were low due to the carrier's reliance on tourism, which accounts for 95% of traffic.

The new international terminal at Istanbul will become THY's transit hub focusing on attracting more business traffic.

THY says that, though a "dormant" member of the Swissair-led Qualifier group, its link to the all-

European alliance will not hamper global alliance aims. All existing groups have already expressed an interest, Haybat says.

On the fleet front, he says THY will probably take up options on new Boeing 737s. Replacement of its 13 Airbus A310s is also "on the agenda. We're looking at the yet-to-be-launched A330-100, but we must see a gain in costs". THY is now flying 737-800s on some A310 routes. □



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Personal jet success for Eclipse

GRAHAM WARWICK/WASHINGTON DC

ECLIPSE AVIATION sold out most of the first two year's production of its Eclipse 500 on the day it opened its orderbook for the \$775,000 personal jet.

Customers who attended the launch in Phoenix, Arizona, on 26 May, placed deposits on all 160 aircraft available from the first two year's of production, says Eclipse president Vern Raburn. Bidders also signed up for some of the 40 aircraft that will be offered via Internet auction. "It was like a revival meeting," he says.

Eclipse, based in Albuquerque, New Mexico, has established three purchase programmes. Platinum Level requires a \$155,000 deposit and guarantees an early delivery position, which is transferable. All 160 Platinum positions were sold on the first day, Raburn says. Eclipse also sold several Gold Level positions, which require a \$37,500 deposit and guarantee delivery from 2005. Deposits will



At \$775,000, the Eclipse 500 forges ahead in the market for personal jets

become non-refundable at the end of August, after Eclipse provides performance and price guarantees for the aircraft, he says.

The company has reserved 40 of the first 200 delivery positions, and 100 of the first 1,000, for internet auction to Bidder's Club members. Membership costs \$5,000 and auctions will be held 120 days before

the date of aircraft delivery. The reserve price will be 5% below the list price, Raburn says. Eclipse 500 deliveries are due to begin in August 2003.

Eclipse's purchase programme differs substantially from that of rival Safire Aircraft, which has assigned over 600 delivery positions for its \$800,000 S-26 personal

aircraft, secured by \$8,000 refundable deposits. Orders will become binding and Safire will request another \$80,000 non-refundable deposits only when the first prototype S-26 flies, in mid-2002.

West Palm Beach, Florida-based Safire, having secured over \$3 million privately, plans to raise up to \$25 million through an initial public offering now under way. This would fund the company through to completion of the conforming prototype. Eclipse, meanwhile, has raised \$60 million from private investors and is beginning a second round of financing.

Safire has more ambitious production plans than Eclipse. The company hopes to build 235 S-26s in the first full year of production, ramping up to over 500 annually within five years.

Raburn says Eclipse's plans are more "modest" and will be paced by the need to monitor the aircraft's performance in service before ramping up production to higher rates. □

Sikorsky S-76 in rotor crack AD

SIKORSKY S-76 operators are inspecting main rotors following the discovery of cracks in blade skins. The US Federal Aviation Administration issued an emergency airworthiness directive (AD) on 26 May after three reports of 1.2-1.8m (4-6ft) sections of blades separating in flight and discovery of a 500mm crack in a blade.

Sikorsky has determined the cracks are the result of the incorrect manufacture of the metal skins by a supplier. Just over 200 blades are affected, involving 70 to 80 of the more than 500 S-76s in service.

The FAA is concerned the separated sections could hit a main or tail rotor blade and cause loss of control. The AD requires operators to visually inspect the upper and lower skins of affected blades immediately and every 3h service use. Sikorsky has developed a repair to end the AD. □

Romaero in JAA step to enhanced credibility

ROMAERO HAS become the first Romanian aircraft company to receive European Joint Aviation Authority JAR-145 approval, paving the way for additional business aircraft maintenance, repair and overhaul (MRO) work for the state-owned manufacturer. "We have undertaken MRO work on most commercial airliners for some time, but this approval finally gives us credibility," says the Bucharest-based company.

The world aircraft sales boom is being felt at the firm with a surge in demand for its services, notably in the manufacture of business and general aviation aircraft parts and sub-assemblies.

This, Romaero claims, represents a thriving segment of its business, with contracts including manufacture of the rear fuselage

for the Galaxy Aerospace Galaxy business jet, empennage for Bombardier's Learjet 45, and the cabin and floats for the Bombardier CL-415 amphibian.

Romaero was recently forced to halt manufacture of the Britten Norman Islander/Trislander fuselage after the UK firm collapsed in April. It says that "since 1968 we have built 570 aircraft for Britten Norman and if things pick up under its new ownership we hope to continue working with them."

Britten-Norman tried to acquire Romaero last year but pulled out, claiming the \$21 million price tag and \$60 million four-year investment programme was too high. Romaero concedes that "the government is still looking for the right buyer, but we can survive without a new owner." □

NEWS IN BRIEF

■ HARTZELL PROP

US firm Hartzell has certificated a 1.98m (78in)-diameter three-blade propeller for the Socata TB 20/21 Trinidad light aircraft, to replace the standard 2.03m two-blade unit. Available for retrofit and as a factory option, the new propeller increases ground clearance, climb performance and reduces cabin noise.

■ TURKISH DELIGHT

Dogus Air of Istanbul, Turkey, has ordered three Bombardier business jets – a Global Express, Challenger 604 and Learjet 60 – in a deal valued at \$78 million. A subsidiary of diversified company Dogus Holdings, Dogus Air is the Turkish agent for TAG Aeronautics, Bombardier's distributor in the Middle East.

Charges due over Greek deaths

DAVID LEARMOUNT/LONDON

NEGLIGENCE AND possibly manslaughter charges are expected to be brought against the pilots, the maintenance organisation and the Greek civil aviation authority (CAA) over the Greek Government Dassault Falcon 900 accident in which seven VIP passengers died.

The accident happened over Romania in September 1999, and although the results of the investigation by the Romanian authorities are not expected until later this month, the Greek prosecutor is acting on information from a paral-

lel study carried out by Athens' own investigators.

There were 13 people on the Falcon 900 bound for Bucharest, Romania, on 14 September 1999, when the aircraft went out of control as the aircraft began its descent towards the airport.

The leaked 45 page report by Greek investigators Alex Fischer and Akrivos Tsolakis says the primary cause was a malfunction in the aircraft's pitch feel system, and although the relevant alert light was on, the pilots ignored it as a false warning. Also the aircraft's checklist did not contain the pro-

cedure for pitch feel failure, which entails reducing the indicated airspeed (IAS) to less than 481km/h (260kt). The aircraft's IAS at top of descent was 621km/h.

Contrary to Dassault's recommended top-of-descent procedure, the report says, the seat belt sign was not on, and during the descent from 15,000ft (4,600m) the pilots lost control. The aircraft shook violently, killing seven unstrapped passengers as they were thrown about the cabin. The pilots recovered control at about 2,000ft and the aircraft landed at Bucharest.

Since the cockpit voice recorder

(CVR) was not working, much of the investigatory information comes from a video of the cabin and cockpit shot by a passenger who subsequently died.

The report alleges that the pitch feel and CVR malfunctions were long-term defects which had not been rectified, hence the intention to prosecute the CAA for poor safety oversight and Olympic Airways, responsible for the aircraft's maintenance. The pitch feel system should have incorporated an approved Dassault modification which had not been carried out, says the report. □

Seabird in Seeker venture with Czechs

QUEENSLAND BASED Seabird Aviation is expected to announce a joint venture at July's Farnborough air show with Czechoslovakian manufacturer Evtor-Aerotechnik. Under the deal, Seabird's purpose-designed Seeker spotter aircraft would be built and marketed by Evtor-Aerotechnik in Europe and the Middle East, and other areas as yet unnamed.

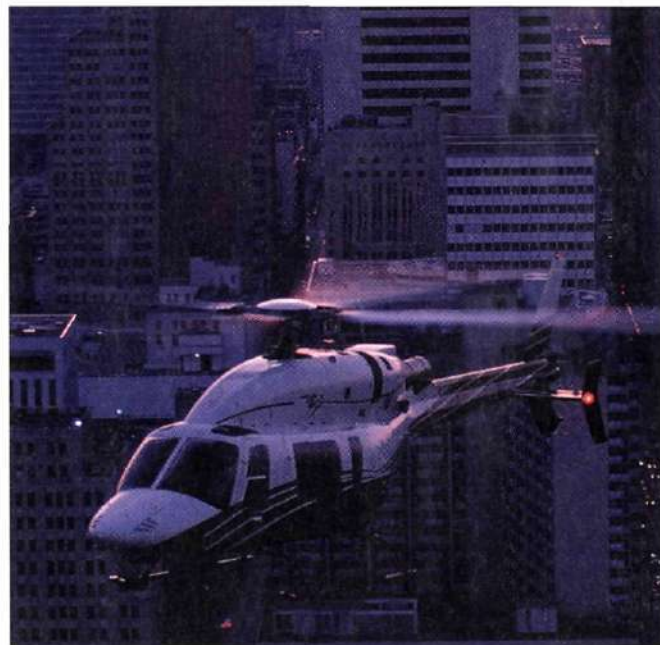
The single-engined Seeker, with a tailwheel undercarriage and a 180hp Textron Lycoming O-360 engine, is designed as an alternative to light helicopters in surveillance roles not requiring vertical landing and takeoff capability.

Seabird says the type's slow-flying capability offers all-round vision from its 'bubble' cockpit configuration, high manoeuvrability in typical observation missions, crew comfort for extended flights, and eight hours endurance.

Two Seeker demonstrators have been completed, and the type has achieved US certification under Federal Air Regulation 23 in the Primary Category, which allows its sale in the USA for observation use.

Seabird designed the aircraft and its production tooling for sale to franchised regional manufacturers under licence, and says all equipment to provide a full manufacturing and assembly capability will fit into two cargo containers. □

Bell 427 helicopter wins dual-pilot certification



BELL'S MODEL 427 helicopter has been certified for dual-pilot instrument flight rules and Category A operations, allowing the light twin to operate in marginal weather conditions with the aid of advanced avionics. The approval comes five months after the twin-engined machine received Federal Aviation Administration certification. Bell has had 85 orders for the multi-mission 427 and three machines have been delivered to corporate and offshore customers. While most 427 orders are earmarked for corporate operators, Bell is targeting the growing emergency medical services, law enforcement and electronic news-gathering markets which, it anticipates, will account for a "sizeable" portion of future 427 sales.

NEWS IN BRIEF

■ FORMULA 146

A second British Aerospace BAe 146-100 acquired by Formula One motor racing entrepreneur Bernie Ecclestone has been painted in corporate colours by Southend UK-based Air Livery. The aircraft will be used as a corporate shuttle to transport Formula One personnel between the European Grand Prix circuits.

■ FACTORY BRAVOS

Helsinki, Finland-based flying college, Pilot Factory, has acquired a fleet of ex-British Aerospace AS-202 FFA Bravos, which will be deployed for ab initio training.

■ CRANKSHAFT ALERT

Teledyne Continental Motors (TCM) is to inspect up to 3,000 engines for possible metallurgical flaws in crankshafts manufactured between April 1998 and March 2000. The problem surfaced last month and prompted the FAA to issue an emergency airworthiness directive. TCM may have to meet \$12 million in inspection and replacement crankshaft costs. It has begun legal action against a number of its suppliers.



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USA to speed satellite exports

GRAHAM WARWICK/WASHINGTON DC

THE US GOVERNMENT is to expedite licensing of communications satellite exports to allies in a bid to counter criticism that current rules are costing US companies business.

The initiative is in response to problems caused by US Congress' decision last year to transfer control of commercial satellite exports from the Department of Commerce to the Department of State.

This was the result of a Congressional committee report which concluded, after investigation of the failure of a Chinese Long March booster to launch a US commercial satellite, that China's ballistic missile developments could have benefited from the transfer of US technology.

The State Department plans to expedite the licensing of exports to US allies of commercial satellites, technologies and components. So-called "Bulk" licenses, valid for

four years, will cover multiple shipments. This includes data required to respond to bids and to secure satellite insurance. Transactions involving launches in China or Russia will continue to require case-by-case approval.

Speeding up the licensing process will help US companies respond to requests for quotations from customers in NATO nations, Argentina, Australia, Egypt, Israel, Japan, Jordan, New Zealand and South Korea. Previously, bids had

often closed before US companies gained approval to respond.

The Commerce Department continues to argue that commercial satellites should be removed entirely from the "munitions list" administered by State. Commerce says the tighter export controls are responsible for a 40% decline in US satellite exports, from \$1.06 billion in 1998 to \$640 million last year. US companies' share of the market has dropped from 73% to 52%, says Commerce. □

H-2 booster in major setback

HUGHES SPACE and Communications has cancelled an order for 10 satellite launches by Japan's uprated H-2A booster. This leaves Space Systems/Loral as the vehicle's only commercial customer, with 10 launch options.

The US company says the terms of its 1996 contract called for cancellation of the order if the H-2, on which the H-2A is based, suffered two back-to-back failures. The Japanese booster failed on its last two launches in February and November last year. Japan's Rocket System, which markets H-2A launches, will refund Hughes' \$30 million deposit.

Citing its desire to encourage new entrants into the commercial launch market, Hughes says it has not cancelled 10 options for future H-2A launches. These could be exercised if Japan gets the simplified, lower-cost version of the booster, the H-2A, operational. The delayed first launch of the H-2A is due early next year.

The European Space Agency (ESA) is keeping to plans to launch the delayed Artemis advanced relay and technology mission satellite next February aboard the first H2A in a non-commercial arrangement.

With Japan getting 40% use of Artemis, ESA declined to fly Artemis on the Boeing Delta III, which is looking for a customer. The first H2A will also carry a small Japanese re-entry vehicle. □

Fifth time lucky for Atlas IIIA

THE FIRST launch of the Lockheed Martin-built Atlas IIIA booster was achieved successfully at Cape Canaveral on 25 May.

The booster, powered by a Russian RD-180 engine and with a single Centaur upper-stage engine, put the Alcatel Space-built Eutelsat W4 communications satellite into an initial orbit, heading for its geostationary position at 36° E.

The commercial launch by International Launch Services (ILS) was the first time a US booster lifted off with a Russian engine.

The vehicle's first stage was originally the USA's first inter-continental ballistic missile. The four previous launches, cancelled because of a combination of weather and technical problems, cost an estimated \$1 billion, says Lockheed Martin.

The RD-180 engine is built by the joint Russian-US company, RD AMROSS, operated by



Atlas IIIA makes a first successful launch

Pratt & Whitney and NPO Energomash. The engine will be the workhorse of the new Atlas V Evolved Expendable Launch Vehicle. With 75% commonality

between the Atlas IIIA and the Atlas V, the flight was a valuable test for many Atlas V parts.

The throttleable, high performance, 800,000lb-thrust (3,556kN) RD-180 burns liquid oxygen and RP-1 propellants. It gives such increased performance over the traditional Rocketdyne-built Atlas powerplant that the Centaur upper stage of the Atlas II needs only one liquid oxygen-liquid hydrogen cryogenic engine compared with the two on the traditional Atlas-Centaur-based models, currently flown as the Atlas IIA.

The performance of the Atlas IIIA booster also exceeds that of the Atlas IIA, which is also powered by four solid rocket boosters. The Atlas IIIA can place 4.1 tonnes into geostationary transfer orbit. The new booster could be flying until 2005, with up to 18 missions. An Atlas IIIB with two Centaur stage engines could put 4.5 tonnes into GTO. □

Loral clinches direct-broadcast satellite deal

LORAL SKYNET has reached agreement to own and operate the C-band payload of the EchoStar IX direct-broadcast satellite, due for launch in 2002, as part of its Telstar fleet.

While EchoStar will use the

Ku-band payload of the Space Systems/Loral-built satellite to broadcast television programming direct to homes, Skynet will use the 24-transponder C-band payload to increase services to cable television operators in the USA.

To be operated by Skynet as Telstar 13, the EchoStar IX satellite will be positioned at 121° W, complementing the company's Telstar 7 spacecraft now at 129° W. Skynet will also provide tracking, telemetry and control services. □

China to develop commercial launch capability

CHINA HAS revealed plans to develop a small commercial satellite launch vehicle based on the solid rocket motors of the Dongfeng intercontinental ballistic missile.

Capable of placing spacecraft weighing up to 300kg (660lbs) into low Earth orbit (LEO), the booster will be able to be launched from a variety of locations based on mobile platforms.

Launches will be made from various land locations, an offshore platform and even from the air using a mother aircraft for deployment. The Chinese claim they will be able to offer customers a launch on demand service requiring as little as 12h notice.

Called the SLV-1, the booster will be aimed at the launch of microsatellite constellations, says the newly formed Space Solid Fuel Rocket Carrier company, which has been set-up to research, develop and manufacture solid propellant rockets. □

OSC launches first suborbital rocket

ORBITAL SCIENCES successfully launched the first in a series of suborbital rockets from Vandenberg AFB, California, on 28 May, under the US Air Force's Orbital/Suborbital Programme Target Launch Vehicle (OSP TLV) programme.

The OSP TLV is the suborbital variant of rockets being developed using Minuteman II intercontinental ballistic missile (ICBM) motors, decommissioned following arms reduction treaties.

The vehicle used three Minuteman stages, in the original ICBM configuration. The first OSP Minuteman-based launcher, called Minotaur, was fired from Vandenberg on 25 January, on an orbital flight with 11 small satellites.

The Minotaur is based on two Minuteman missile stages with an upper stage from the OSC Pegasus air-launched satellite vehicle. □

Arianespace adds Eurokot to satellite launcher range

TIM FURNISS/LONDON

ARIANESPACE IS to add the Eurokot small satellite launcher to its commercial booster operation. The deal follows the launch of the Russian-German Eurokot company's first vehicle – based on the Rokot, a converted SS-19 intercontinental ballistic missile – from Plesetsk on 16 May (*Flight International* 23-29 May) carrying two dummy satellites into orbit.

Arianespace is likely to become a shareholder in Eurokot as it is in the Russian-European Starsem launcher organisation which operates Soyuz Ikar and Fregat boosters.

The European launcher company is a shareholder in Starsem along with Aerospaciale Matra, Samara and the Russian Space Agency, and it is likely that Eurokot – a DaimlerChrysler Aerospace and Khrunichev joint venture – will be joined by Arianespace.

With the Eurokot and Soyuz fleet and its own Ariane 4 and 5 vehicles, Arianespace will have a full range of satellite launchers for all types of customers covering the small, medium and large range of satellites for low, medium and geostationary orbit transportation.

The development with Eurokot is likely to result in a change of direction for the proposed

European Space Agency-led Vega small satellite launcher project being developed with Italy and France.

With the Ariane 4 fleet to be retired in about 2002, the Vega could become a new medium-class booster based on improved Ariane 5 solid rockets, making its first flight in 2004-05, carrying single satellite payloads weighing 3.5 tonnes into geostationary transfer orbit (GTO).

The new Vega would effectively replace the mid-range Ariane 4 boosters, the 42L or 44P, carrying single satellite payloads of 3.5 tonnes, while Ariane 5 concentrates on twin-satellite payload launches.

Ariane 5 is being up-rated with new upper stages which will increase its GTO capability from 6 tonnes to 10 tonnes, then to 12 tonnes by 2005. Flying a single 3.5-tonne satellite on Ariane 5 would be unprofitable, and the vehicle will not be able to launch two payloads of this weight until it is upgraded.

The scheme to broaden the product range offered by Arianespace emerged as the European space launcher company revealed its financial performance for last year. Arianespace posted sales of €976 million (\$904 million) in 1999, compared with €1.1bil-

lion the previous year.

The revenues were generated by nine Ariane 4 and one Ariane 5 commercial launches. Net profit fell to €7.3 million, compared with €14 million in 1998, mainly due to a bigger tax bill last year.

The company achieved 10 Ariane 4 and 5 launches in 1999, with seven between August and December, after a gap caused by late delivery of satellites. Arianespace's plans call for the launch of up to eight Ariane 5 boosters a year by 2003.

Arianespace won 12 satellite launch contracts last year and, since January, has secured a further five new deals, the latest of which, for the launch of Canada's Hughes-built HS-702-based Anik F2, was signed on 30 May, bringing the number of spacecraft on its order book to 40.

Arianespace is also poised for a European Space Agency contract for six Ariane 5 launches to carry Automatic Transfer Vehicles for the International Space Station. The contract will be officially signed at the Berlin air show which starts on 6 June.


The next launch, scheduled for 25 July, will be made by an Ariane 5, carrying the Astra 2B and GE-7 satellites, after another delay in launches due to late satellite deliveries. □

Successful Atlantis mission prepares ISS for Russian Zvezda



Atlantis returns to the Kennedy Space Centre after its STS 101 mission

THE SPACE Shuttle *Atlantis* landed at the Kennedy Space Centre on 30 May, following a nine day 20hr mission to the International Space Station's Unity/Zarya modules. The almost flawless mission has prepared the ISS to receive the Russian Zvezda service module after its launch on 12 July and for another visit by *Atlantis* on mission STS 106 in September. The ISS is expected to be manned by the first Expedition Crew in October.



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The "big three" US airlines – American, Delta and United – may have followed similar paths, but they have different strengths

CHRIS JASPER/WASHINGTON DC



SINCE DEREGULATION in 1978 the US airline industry has changed to such a degree that the sector is barely identifiable with that of the pre-liberalisation era. And most notable in this transformation has been the emergence of three huge US carriers, based at three equally titanic US airports.

It would be natural to conclude that United Airlines, American Airlines and Delta Air Lines have each attained 'giant' status by following similar strategies, and to an extent they have. All three have built major hubs and established spoke systems around them (together with secondary and tertiary hubs), all have embarked on the switch from turboprop- to jet-powered regional aircraft fleets, and all are major players in global airline alliances.

Yet beyond these obvious similarities are major differences between the three. The strategies they have pursued, though parallel, mean each has evolved wildly varying strengths and weaknesses, and that each has positioned itself very differently for the challenges of the third decade of the post-liberalisation era. That positioning is now more crucial than ever, in that the rapid change that gripped the US industry throughout much of the 1980s and 1990s has to a degree plateaued, with the hub system now essentially mature. Room for manoeuvre suddenly seems far more restricted, and only moves of the size of United's recent swoop for US Airways are likely to change the landscape radically.

The US "big three" are giants by any reckoning, occupying the world's top three positions

United, already one of the US "big three", plans to become even larger by purchasing US Airways

for the key parameters of sales (with the occasional challenge from British Airways and Lufthansa), traffic and passenger numbers. American's parent AMR ranks number one by revenue, with its airline and Sabre operations (the latter now spun off) reporting a turnover of more than \$20 billion last year. United had the most traffic (more than 200 billion revenue passenger kilometres) and Delta carried the highest number of passengers at nearly 106 million.

The trio's home bases have become three of the world's largest airports because of the airlines' hub-building strategies. Atlanta (Delta), Chicago (United) and Dallas/Forth Worth (American) are the world's three busiest airports in terms of movements, while Atlanta and Chicago also rank one and two in passenger throughput, with Dallas ranking just behind Los Angeles and London Heathrow.

Contrasts between the three have evolved despite their commitment to a common aim that Delta's vice president, network analysis, Douglas Blissit, defines as "getting people from everywhere to anywhere". More precisely, he says "major airline" strategy is aimed at "providing best overall coverage out of core markets and being the airline of choice out of our core cities", adding: "The goal in this industry is to become the carrier of choice to where you fly. If you can create more value for the people in a given city through a range of products and fares



Delta's Atlanta hub is now the world's busiest airport ahead of United's Chicago base

—business, leisure and international—you win a disproportionate share of loyalty."

Post-liberalisation, the establishment of core markets has centred on hub-building. Delta, for example, has established four key domestic hubs — Atlanta and Cincinnati, plus Dallas and Salt

Lake City — supplemented by international gateways, which it aims to "leverage" further where possible. United's hubs are at Chicago, Denver, San Francisco, Los Angeles and Washington DC, and American's at Dallas, Chicago, Miami and New York. While each air-

United: aiming for national coverage

CHRIS JASPER/WASHINGTON DC

THOUGH United Airlines' planned takeover of US Airways, announced last month, is remarkable for several reasons, its essential characteristic is size. United is already a "super-carrier", and by absorbing US it will move to another level, with an annual turnover almost a quarter greater than its nearest rival, AMR/American Airlines.

Despite United's already considerable bulk, it would be wrong, however, to dismiss the takeover as inspired solely by the desire to further add to its own mass, because for the Chicago-based giant, the US Airways deal is really about attaining national coverage. When US chairman Stephen Wolf describes the merger as "a milestone in commercial aviation" he is talking not so much about the transaction's size — total value \$11.6 billion — but its impact. UAL chairman James Goodwin says that through it United will become the

country's first truly national airline — by which he means "the first carrier with a strong presence across the USA".

Goodwin says that his airline "had a strategic void on the east coast", a deficiency it attempted to address through a takeover bid five years previously, only to be frustrated by the smaller airline's "poor fitness" and a failure to reach agreement at the highest level.

United president Rono Dutta adds that the airline lacks clout in the east, and also is too clearly structured along east-west, transcontinental lines. "United is a rather strong airline west of Chicago," he says. "In the west we have a 20% plus market share, but in the northeast we are a very weak player, with less than 8% market share — and that particular region is the most important aviation market in the world. Our hub structure of Chicago, San Francisco, Denver and Los Angeles secures customers going into the west coast, but not the east. Also, we may be strong east-west, but we are not north-south, which is where US are strong."

Dutta says a secondary motivation is the need to grow into smaller markets. "Some 10-15 years ago most growth was between major cities," he says. "But we have since seen growth in secondary markets, and to serve that market we need lots of hubs across the country, as well as around the world."

The 'new United', should it clear unions and the regulators, will indeed be a "national" air-



"We need lots of hubs across the country as well as around the world," — Rono Dutta

line, strong in all directions, with a nationwide regional operation (likely to be formed through the merger of United Express and US Airways Express), a low-cost operation in both the east (MetroJet) and west (United Shuttle) to take on Southwest Airlines and Delta Express, and a commuter subsidiary in the lucrative eastern corridor (US Airways Shuttle). As such, it will change the face of the entire US airline industry. □





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line has areas of geographical strength, there are also areas of major overlap, especially in Chicago and Dallas. It is not so much overlap that determines competition, however, as the connections that can be made via hubs. Two airlines are just as likely to compete for traffic between two given cities by offering services routed via different hubs as they are to compete at a given hub that both use.

Delta, Blissit says, views point-to-point services as supplementing the hub and spoke system. Where there are obvious business opportunities it is prepared to offer service, such as a recently launched New York-Los Angeles morning flight, which offers no connections with transatlantic operations. Its Delta Express low fare business, which operates from the northeast USA to Florida and has grown to operate 44 aircraft, is also a point-to-point service, as is Delta Shuttle, a unit of the mainline airline which specialises in east coast commuter flights. Through it, Delta has become the number one airline in Boston and New York

LaGuardia, giving it north-south strength distinct from its east-west hub structure.

With domestic services accounting for 80% of business, international services are not exactly core to US major airline operations, and glaring gaps often exist in coverage. Delta has built New York JFK into the largest international gateway of any US carrier, and offers 16 daily international departures out of Atlanta, giving it strength in Europe and Latin America. Yet, transpacific coverage is much more patchy. "We don't have a significant Asian presence", admits Horton, who hopes that an application for flights to China will help address this problem.

New routes aside, global alliance-building is the most effective tool in eliminating international weaknesses. Codesharing alone increases revenues through ticket sales on flights operated by partner carriers, and more importantly it increases flows into domestic networks via gateway hubs.

Those domestic networks, transformed by



From Cincinnati, Comair's feed supplies 12-15 percentage points of Delta mainline's load factor

Delta pioneers regional jet revolution

CHRIS JASPER/ATLANTA

WHILE ALL US majors airlines have embraced the coming of the regional jet, it is Delta that has shown the rest the way. The carrier's regional subsidiary, Delta Connection, already operates nearly 150 regional jets – more than any other airline – while in April, Delta signalled the importance of the RJ in its strategic thinking by striking a massive \$10 billion deal with Bombardier for a further 500 aircraft.

Delta's vice president for network analysis, Douglas Blissit, says regional jets "represent the biggest technological breakthrough in the 30 years since big jets were created", although, ironically, the Atlanta-based giant was not initially convinced of the 50-seat jet's viability.

Historically, the smallest jet in the Delta fleet had been the 100-seat Boeing 737-200 (an aircraft now operating with low-cost subsidiary Delta Express), so that, says Blissit, "unless a destination could put a good load on a 100-seat aircraft, and with a good business mix, we could not operate it". This began to change in the 1980s, when Delta and other carriers began offering regional turboprop services on hitherto uneconomic routes, bringing them into networks and offering connections with mainline flights. The big switch came in



Regional jets are "the biggest technological breakthrough in 30 years" – Douglas Blissit

the early 1990s, however, when Delta Connection operator Comair – then fully independent, and using its own cash – became the first US airline to order Bombardier's 50-seat Canadair Regional Jet (CRJ), taking delivery from April 1993.

"That was a big gamble," says Blissit. "Everyone else said there was no way of making that work economically. Delta supported them – but it was not our dollars". The gamble turned into "a massive success story", Blissit recalls, with Comair deploying the new aircraft aggressively from its Cincinnati hub and making viable sub-100-seat services of 800km (500m)-plus (the effective turboprop range limit, as opposed to 1,900km for RJs).

Customer acceptance was also crucial, with fast, quiet regional jets quickly proving more

popular than turboprops which had been perceived as slow, noisy, 'bumpy' and unreliable. "People love the aircraft", adds Blissit. "It has changed the way customers travel to medium and small business centres".

Neither was the RJ's role restricted to minor destinations. The aircraft quickly carved out a niche in offering high frequencies on high density routes such as Cincinnati to Detroit, New York and Washington DC. Though seat costs are higher, its trip costs proved lower. Comair's lead was followed by fellow Delta Connection carrier Atlantic Southeast Airlines (ASA), based in Atlanta, and by SkyWest Airlines, operating into Delta hub Salt Lake City. The CRJ's range also meant that 'raiding' services into rival hubs became possible.

Regional jet feed has become vital to the hub-and-spoke system, and is now central to the economics of mainline operation. "We put more people into Atlanta, Dallas, Cincinnati and Salt Lake, so it's easier to support new big jet services from most points," Blissit says. In Cincinnati, for example, Comair feed equates to 12-15 percentage points of load factor, and without this Delta's own load factor – averaging a respectable 72% – would drop to an non-viable 58%.

Delta's RJ operations themselves have load factors in the 68-70% range, and of 35 passengers on a typical ASA flight, 32 are likely to be transferring onto Delta's large jets.

The RJ revolution has also produced what Blissit terms "some surprising results". Though Atlanta-Boston is hourly, for example, Delta is still able to operate regional jets into some satellite airports, such as Worcester, Massachusetts, which is served by ASA. Manchester, New Hampshire, has meanwhile proved so popular as a regional jet destination

that Delta is to relaunch it as a mainline service using 140-seat McDonnell Douglas MD-80s.

Blissit argues that regional jets have also been a boon to the public, and have encouraged competition by improving network development. "Take Charleston," he says. "It was always possible to fly to Atlanta with Delta and Charlotte with US Airways – but now regional jets mean customers can fly to New York and Dallas with Delta and American, Chicago with Delta and United, and Memphis with Northwest."

Regional jets now "cut across all our strategies, and will fly across all our hubs", including Dallas, Blissit says. Feeder service is meanwhile being established into New York Kennedy, while Atlantic Coast Jet, based at Washington Dulles, begins Delta Connection services in the northeast this month. The airline has 25 CRJ-200ERs and 25 33-seat Fairchild 328JETs on order. Slot relaxation at New York LaGuardia has also permitted the launch of 21 services to the southeast which had previously been deemed "too small" for

point-to-point operation.

Though Delta claims to have led the way in establishing regional jet operated hub-and-spoke and point-to-point operations, it acknowledges that the rest of the US industry was quick to follow suit, which made it crucial to retain control over the Delta Connection business. This was ultimately achieved last year through the purchase of 90% of ASA and of 100% of Comair. Though Delta says that strong economic motivations underlay both purchases (see *main story*), it admits that – to a degree – its hand was forced.

Poor standards of service at ASA reflected badly on Delta, with which the smaller carrier's customers were connecting, and although the pair made repeated attempts to resolve these issues, "progress was not to our satisfaction", Blissit says, causing the major to step in and take control.

The Comair situation differed in that the airline provided vital feed into Delta's secondary hub, Cincinnati, yet – in theory at least – was free to switch camp if it saw fit. That

prospect appeared less theoretical when Business Express Airlines, which had provided Delta with feed in Boston and LaGuardia, was bought by Delta Connection rival American Eagle in late 1998. Says Blissit: "That woke us up to the fact that the rest of the industry had figured out the way forward, and the best regional operator out there was Comair – but we only had 20% of it." Noises from Comair suggested the airline was aware of its true worth, and Delta was forced to buy the remaining 80% for \$1.8 billion.

The April order for 500 more CRJs testifies to Delta's conviction that regional jets will play a central role in future hub and network development, Blissit says, with the airline happy to risk its own money on their purchase.

With 94 firm orders and 406 options, the Delta fleet will grow to more than 600 aircraft, representing a third of all US operated, ordered or optioned RJs. And such is Delta's ordering power that it has been able to specify 40- and 44-seat versions of its 50-seat workhorse. □



American, Delta and United all have complex hub systems, while US Airways is strong in the east

the hub-and-spoke system, are themselves undergoing a new revolution with the introduction of regional jets (RJs). As Blissit notes, mature hubs now enjoy a modest growth rate of around 3%, with "most of the operations exploited to the full" – but previously untapped routes opened up by RJs have produced 100% growth over the first few years, and are expected to continue producing 20% growth for at least the next three. Margins are also higher, and predicted to remain double-digit for five years.

Regional jet network and fleet development has again varied from carrier to carrier, with the Delta Connection airlines leading the way, with big Bombardier Canadair Regional Jet orders from 1993, and Continental Express (the biggest Embraer Regional Jet operator, having first placed orders in 1997) and American Eagle relatively close behind. The latter is wholly owned by its parent, unlike other regional

operations, and is also the world's biggest regional airline – although it has been slower in making the RJ transition.

Such has been the impact of RJs in increasing

feed (Delta is even introducing them to the Caribbean and Central America) that – until the United/US deal – most recent US airline takeover activity focused squarely on consolidating regional airline operations.

Economics has been the prime motivation, with big jet carriers aware that non-owned franchisees will always favour their own shareholders, a problem which can be solved only through takeovers. Revenue management was also a problem, with feeder airlines favouring local services ahead of transcontinental flights which net them a smaller share of the pie.

In the regional market, US scope clause restrictions are the main obstacle to further expansion, and here Delta has an advantage, with a wider-ranging pilot agreement. American, for example, has a 67-aircraft ceiling on regional jets seating 45 people or more, restricting severely its deployment of 50 and 70 seater aircraft. Scope clauses mean that expansion beyond 70 seats will prove difficult, and a 90-seater operated as a mainline aircraft is uneconomic. Many US airline executives nev-



American Airlines, which has painted a Boeing 757 in retro livery, has built its Dallas hub since 1979



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American operates a dual hub system based on Dallas/Fort Worth and Chicago O'Hare

ertheless say such a move is a definite aim.

Secure in their hubs, US carriers have spent the last few years jousting for position by developing secondary networks and introducing regional jets, establishing low-cost operations (though Blissit claims Delta Express is the only fully profitable low fare division of a major airline) point-to-point service where practicable, and expanding international coverage through global alliances.

The only serious departure from this orthodoxy of organic development through steady expansion of service seemed likely to come from industry consolidation – and so it did. Despite their strengths, all three US giants have clear gaps in their armoury, and given the mature nature of the sector in the USA, it will always be easier to close this through acquisitions rather than by expanding into alien territory.

United's agreed purchase of US Airways reflects this fact. Though American admits that it, too, moved for the smaller airline, United's need was greater, because unlike both the Dallas-based carrier and Delta, it lacks any meaningful operation in the eastern USA. Should the deal go through, however, United will have national coverage better than that available to its rivals, and will also be an order of magnitude bigger than them.

This means life has become more complicated for Delta and American, with the status quo under threat and the effectiveness of continued organic growth suddenly in doubt. Retaliatory moves therefore become not just possible but probable. Taken to the extreme, consolidation could see the six US majors reduced to three, with the three existing giants at their core – perhaps United/US, American with Northwest (which hubs at Minneapolis, Detroit and Memphis) and Delta with Continental (Houston, Cleveland and New York Newark).

Regulatory hurdles, though, mean such a scenario is years off, and attempted moves, even by Northwest and Continental, the USA's number four and number five carriers, have, so far, proved unacceptable. □

American: building a hub strategy

CHRIS JASPER/DALLAS

AERICAN Airlines was the world's largest carrier in sales terms last year, with parent AMR's turnover topping \$20 billion. Suddenly, though, it faces a huge challenge from United Airlines, always its closest rival and set to surge ahead via the purchase of US Airways, giving the Chicago-based carrier a truly nationwide presence.

The question for American is quite how to respond. Tom Horton, chief financial officer and senior vice president for finance, emphasises the carrier's financial discipline, but makes it equally clear that it has cash in the war chest if it needs to spend. American was itself regarded as a possible purchaser of US, or other carriers, although in some ways the profile of its own national coverage – in many ways superior to United's – would have made the takeover target a poorer fit.

American, for example, can already claim to operate the USA's only true 'dual hub' system, given its strengths in secondary hub Chicago, and unlike United its weaknesses are mainly in the west, and would therefore have been little helped by a move for eastern-oriented US.

Though American Airlines began life in Dallas, it later domiciled in New York before moving its headquarters back to Texas in 1979 with the aim of repositioning itself to take advantage of the industry deregulation introduced at that time. Central to its strategy was growth at Dallas/Fort Worth airport, which had opened in 1974, and where American had beaten off the challenge of another Texan carrier, Braniff International.

American expanded dramatically at DFW, building up what Horton believes is a "tremendous operation" there, and now offers more than 800 departures a day. Though American does not claim to have originated the hub-and-spoke system, it argues that it was "most effective" in developing it during the 1980s and into the 1990s, with the establishment of Chicago O'Hare as a secondary base. In United's backyard, American has built up a business larger than any other secondary hub. Regional operator American Eagle launched its first regional jet service out of the airport in May 1998, and American aims to bolster the operation further by replacing all turboprops with Embraer regional jets by November.

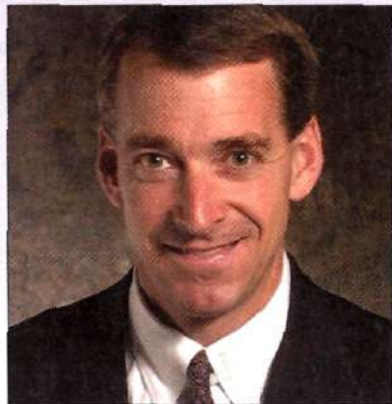
Chicago is also American's biggest international gateway, with the airline the airport's

biggest international operator – larger, even, than United. Miami, American's third hub, was inherited when the carrier bought Eastern Airlines' Latin American operations in 1990 in what Horton says turned out to be a move of "crucial strategic importance". Established despite great economic and political instability in Latin America, Miami (complemented by San Juan) has been "wildly successful", Horton says, making American the biggest 'Latin American carrier' by a wide margin.

The airline's three key hubs are complemented by what Horton calls "focus" operations – the gateway cities of Los Angeles, Boston and New York Kennedy, which are set for significant expansion. American also had hubs in Raleigh, Nashville and San José, but chose to wind them down. The latter, however, is being built up again following the purchase last year of Reno Air, a move which met with great union resistance and which hinted at American's major blindspot in the west.

Horton says the Reno operation, now folded into American's mainline, is "very dependable" and has "exceeded expectations" financially. After "rescheduling and pruning" a new schedule is being rolled out to offer "four or five good departures a day" on core routes, rather than attempting to compete with Southwest Airlines and United Shuttle. American still lacks firepower in the west, however, making further moves – perhaps for Phoenix-based America West – a possibility.

Horton stresses that American is "financially stronger than ever, with \$2.5 billion cash, a \$1 billion revolver and \$8 billion in unencumbered assets", but insists that the carrier won't be bounced into a deal. A \$2.6 stock buy-back programme was recently regarded as more prudent than any takeover options, and Horton warns that despite continuing growth in the US economy, "this still a cyclical industry". He adds: "This is also an industry that is undergoing a lot of change right now. That can take many forms, as we've seen recently. And if our time comes we are well positioned." □



"We are well positioned" for major moves – Tom Horton

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Defence harmonisation is the key to solving the US-European credibility gap, say industry chiefs

The Tomahawk cruise missile is just one of many precision weapons in the US arsenal

ANDREW DOYLE/BRUSSELS

LAST YEAR'S NATO campaign in Kosovo highlighted the marked superiority of the US military forces, particularly in precision bombing, strategic transport and command and control.

The disparity is further exacerbated by the USA not only spending significantly more on defence procurement than its European partners, but also up to four times as much (around \$40 billion annually) on defence-related research and development.

On the industrial side, Europe is already taking steps to address the imbalance with rapid

consolidation, culminating in the merger between BAE and Marconi Electronic Systems to form BAE Systems, and the pending establishment of the European Aeronautic Defence and Space (EADS), Aerospatiale-Matra, Casa and DaimlerChrysler Aerospace (Dasa), with EADS and Alenia forming a further venture.

Industrialists argue that governments need to take urgent action to harmonise military requirements, research funding and export controls so that companies such as EADS and BAE can extract the necessary efficiency gains to put the continent on an equal footing with the USA. This will not be achieved, they believe, if Europe's new defence champions have to con-

tinue dealing with a diverse customer base of 15 national markets.

Defence company executives, meeting at the recent 5th *Forum Europe* Defence Industries Conference in Brussels on 23 May, discussed how to ensure that the planned establishment of a European Union (EU) common foreign and security policy will serve to strengthen Europe's armed forces and its defence industries.

"First of all we have to improve the military capabilities of most European countries," NATO Secretary-General Lord Robertson told delegates in his keynote address. Without NATO, and therefore the USA's military might, Europe is "unable to take on even small to medium operations," he says.

EUROPE MUST RE-PRIORITISE

Late last year, EU leaders committed themselves to setting up by 2003 a 60,000-troop rapid reaction force capable of mobilising with 60 days notice and being sustained for up to a year. "I think the penny is beginning to drop all around Europe as to what they signed up for last December," says Robertson.

Indeed, many in industry believe that the target for implementing the rapid reaction force cannot be met or made affordable without meaningful harmonisation of procurement procedures and the establishment of a common European defence equipment market.

Robertson is now urging governments to "re-prioritise" their defence spending to focus on acquisition of equipment necessary for "modern" conflicts and research and development, while unloading many of the military's non-front-line tasks to the private sector to ensure that the armed forces of the future are structured to provide instantly usable capabilities for any likely contingency operations.

"Governments will have to spend their defence budgets more wisely, take courageous decisions and probably spend more," says Robertson. Opening up the US defence market to European suppliers and vice versa and relaxing controls on transatlantic mergers and acquisitions would do much to ensure that "we go forward in a dynamic fashion", he adds.

Eyeing this long-term goal, Northrop Grumman and Dasa recently signed a memorandum of understanding to study closer co-operation in the fields of surveillance and command, control, communications and intelligence systems. However such initiatives are severely constrained by rules governing technology transfer (particularly from the USA to Europe) and market access.

"I think that we are at the point of crisis in the disparity in doctrine and technical capabilities between the USA and the alliance partners," says Ralph Crosby, Northrop Grumman's president of integrated systems and aerostructures.

"Further, I believe that true bi-directional transatlantic military/industrial linkages are essential and fundamental elements not only in rectifying the gaps in capability, but also as the

"Governments will have to spend their defence budgets more wisely, take courageous decisions and probably spend more," – Lord George Robertson, Secretary-General of NATO

key to strengthening the European defence industry," he adds.

Crosby is encouraged by recent, albeit limited, progress in technology transfer reforms led by the Pentagon's acquisitions and technology chief, Jacques Gansler. But he urges Europe to make sure it plays its part in the process.

Echoing the sentiments of many in the industry, he is adamant that creating "fortress Europe and fortress America" would only be counter-productive and "must be avoided". But the most immediate priority is to rationalise Europe's armed forces, underfunded compared with US standards, and, he says, woefully inefficient.

"In a world of tight defence budgets, Europeans ought to be making considerable progress in the pooling and funding of their research and development and defence capabilities at European level," says Thomas Enders, Dasa's director for corporate development and technology, and designated head of the EADS military division.

HARMONISING ASSETS

"Starting right from today, Europe could agree on pooling capacities towards a joint air-lift force, a joint air refuelling or a joint electronic warfare fleet," Enders adds. He says there are significant near-term opportunities to harmonise joint transatlantic assets and capabilities, one example being the NATO Airborne Ground Surveillance requirement.

The achievements to date on this front, however, are not encouraging. Industry executives are frustrated that a letter of intent on harmonisation signed two years ago by the governments of France, Germany, Italy, Spain, Sweden and the UK has still not been converted into a formal framework agreement. The six nations together are home to 90% of the EU's defence industry, measured by new product development capacity.

If implemented, the agreement – details of which are still being negotiated by the govern-

ments – would be the first step towards freeing up international defence trade within Europe.

Enders says the framework agreement is needed urgently so that industry has a "common political view" surrounding harmonisation of export controls, defence-related research and technology and procurement requirements.

He views lack of progress on the framework agreement as a "very appalling situation" since it threatens to prevent the EADS partners from realising the full cost benefits of their merger.

"The European ministries of defence could immediately benefit from the EADS cross-border merger since it provides a unique focus and a roof for joint European programmes," says Enders. The six governments now aim to sign the framework agreement in July before the Farnborough air show.

Also troubling Dasa is Germany's recent unilateral decision to tighten its export controls, which the company believes runs contrary to efforts to consolidate the European aerospace and defence industry.

Few in the industry would disagree that harmonising procurement requirements between countries is vital to boosting European forces' effectiveness, but whether a single European procurement agency is desirable remains open to debate. A pan-European acquisition agency known as OCCAR is to be legally established within the next two months and will probably be used by the nations intending to buy the Airbus A400M transport.

Saab senior executive vice-president Lars Josefsson says: "It is essential that we do not establish a 'fortress Europe' by creating a single acquisition agency and only one international industry in each industrial area. That would merely lead to a planned economy," he adds.

"It is another thing to co-ordinate and harmonise various countries' military requirements in order to become more cost-efficient," says Josefsson. "What we need is a single market where I would welcome as many customers as

possible." Looking further ahead he sees a single transatlantic defence market as a "realisable goal" within the next 10 years.

Potentially the most significant obstacle to creating a true transatlantic defence market is technology transfer from the USA to European countries. There is concern in the US Congress about whether European nations can be trusted to prevent cutting-edge US defence technology from falling into the wrong hands. There is also resentment that the USA, which proportionally spends much more on research than the EU countries, should feel obliged to hand over intellectual property that has been developed at great expense.

CREDIBILITY PROBLEM

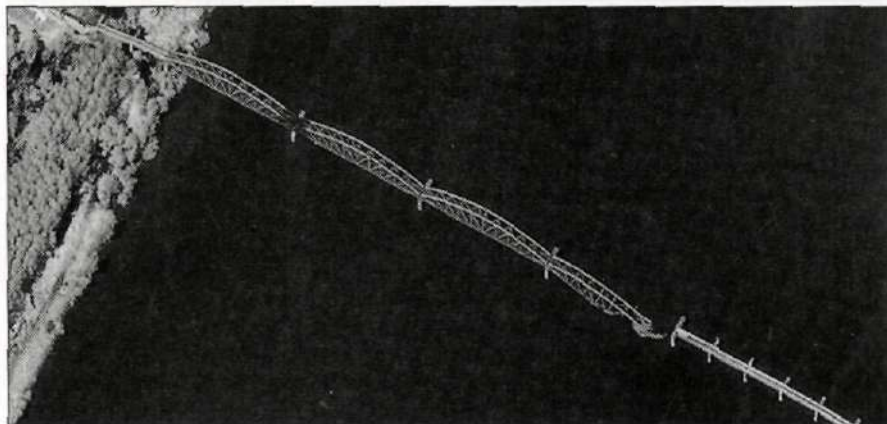
"Europe has a credibility problem with the USA," explains Donald Baker, director of the armaments co-operation division at the US mission to NATO. "The US sees Europe's lack of spending as a lack of commitment." He believes that this is hampering progress on implementing the NATO defence capabilities initiative agreed at last year's summit in Washington DC.

"Unless these spending levels come up, the problem is going to persist," he says, adding that the USA has yet to be convinced of the wisdom of releasing sensitive technologies to help prop up Europe's defence capabilities. "We want to share it with our allies but we certainly don't want it to fall into third-party hands," says Baker. "It's a preoccupation in the USA that Europe does not protect its technology as well as it should."

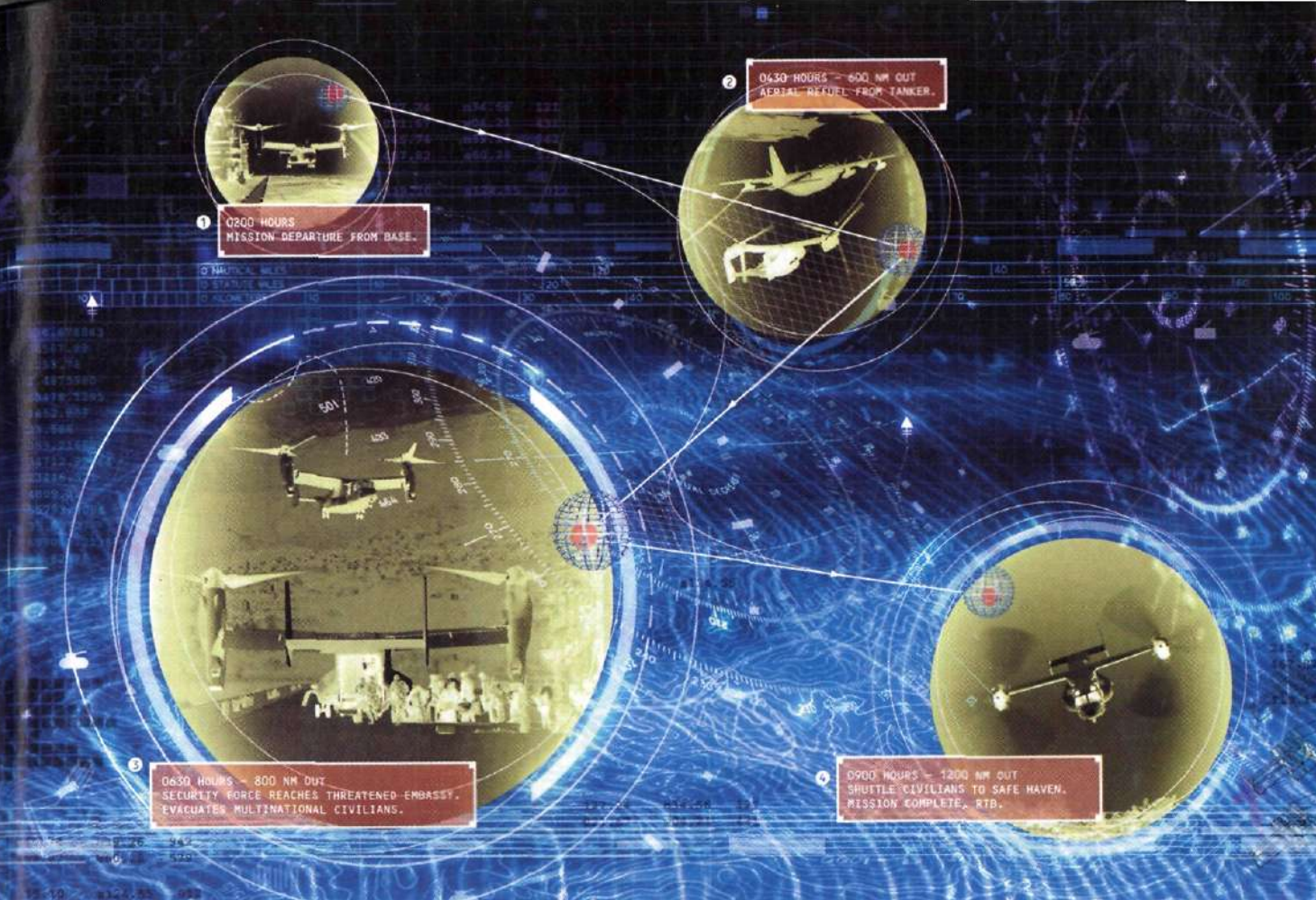
Meanwhile, the European Commission is trying to develop a strategy to boost the European defence industry's competitiveness by encouraging the council of ministers to adopt a common European armaments policy. But to industry's acute disappointment, little progress has been made.

"We were not able to make as much progress as one might have hoped in implementing this strategy," admits Erkki Liikanen, European commissioner for the enterprise and information society. "That is why the time has come to revitalise this process at Commission level to identify the immediate priorities for action to match recent political and industrial progress."

Liikanen says the Commission is considering a follow-up communiqué to accelerate the adoption of key proposals on the creation of a single European defence market, and that "the European defence industry cannot remain competitive on the global stage unless allowed to benefit from the supply-side consolidation which has taken place or is still to come. Without consolidation on the demand side, the Euroindustry cannot succeed in rivalling its major competitors."



The Ostruznica railway bridge in Serbia was hit in the NATO bombing last year



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Last year saw three high-profile air fatalities. General and corporate aviation should start worrying

Tarnished image



Involvement of high profile people in corporate aircraft accidents affects safety perceptions - racing driver David Coulthard emerged safely from this crash

DAVID LEARMOUNT/LONDON

LAST YEAR TAINTED corporate aviation's safety image, and this year has started badly. Several high-profile public figures lost or came close to losing their lives in corporate and general aviation aircraft accidents.

In pure safety terms, it should only matter that life is lost, not whose life it is. But for the corporate aviation industry, from manufacturer onward, high-profile lives stand out. Corporate aviation is the chosen transport of many VIPs, sportsmen and women and wealthy individuals, so any accident to a business jet or high-specification light aircraft has an above-average chance of involving high-profile casualties.

All such accidents put the aircraft and their operation in the spotlight. This may have an

insidious and unquantifiable effect on corporate decisions to invest in aircraft.

Senior executives worry as much about flight safety as anyone else. Many large multinational companies have long had policies about not putting more than one very senior executive on the same airliner or corporate jet when they would probably not think twice about putting them in the same car or train.

Last year was certainly not favourable either statistically or in image terms. The listed turbine aircraft accidents in 1999 compared with 1998 rose from 70 to 100, and fatal accidents from 29 to 40 (see accident tables starting P51).

Three "high-profile" corporate or general aviation events occurred during 1999. Greece's deputy foreign minister and six other passengers were killed when the pilots lost control of

the Greek presidential Dassault Falcon 900 aircraft during descent into Bucharest, Romania on 14 September. Golf star Payne Stewart and two pilots died in an unnerving Learjet 35 accident in which the aircraft flew on autopilot for about four hours with no signs of life on board until it ran out of fuel and crashed in South Dakota (24 October).

Flying his own single-engine piston-powered Piper Saratoga, John F Kennedy Jnr and his wife died during an instrument meteorological conditions (IMC) approach to Martha's Vineyard on the US east coast. This year, racing driver David Coulthard escaped from a badly damaged Learjet 35A in which both pilots were killed on landing at Lyon, France (*Flight International*, 9-16 May, P29). Only last week two leading UK-based jockeys

were injured and the pilot killed when a Piper Seneca crashed on takeoff from a race course.

In Greece the emerging details of the presidential Falcon accident (see P27) have begun to cause a stir. A leaked investigator's report blames almost all the parties involved for what amounts to complacency – a trait not normally associated with presidential aircraft operations. The aircraft's operators, Olympic Airways, are threatened with prosecution for alleged negligence in maintenance and for the aircraft's inadequate emergency checklist. The pilots are accused of ignoring standard operating procedures and the civil aviation authority is charged with failing in its safety oversight duties.

Although the aircraft made a safe landing at its destination, Bucharest, with no external sign of damage, the cabin was in turmoil with six passengers dead, one dying, one seriously injured and two with minor injuries. Those who survived without serious injury, including the flight crew of three, did so because they were wearing their seat belts when, during the descent, the aircraft began to porpoise violently, throwing the passengers from the cabin floor to the roof and back again. The official accident report by the Romanian authorities is expected later this month. Meanwhile, a parallel Greek investigation has pinpointed a malfunctioning pitch feel system as the accident's primary cause.

Video shot by one of the casualties reveals that, though illuminated, the instrument-panel caution light indicating the pitch feel malfunction was ignored by the pilots. Crucially, the checklist did not contain the procedure for dealing with the problem, which includes slowing the aircraft to less than 260kt (481 km/h) indicated airspeed (IAS).

The report alleges that the cockpit voice recorder (CVR), which was unserviceable, and the pitch feel fault were long-standing defects which had not been rectified, and that the pitch feel would not have malfunctioned if a recommended modification had been carried out.

HYPOXIA THEORY

The cause of the Payne Stewart Learjet accident is still a mystery. Military aircraft flew alongside the fated aircraft and reported misted cabin windows and no signs of activity or of external damage. Unsubstantiated industry suggestions are that – contrary to initial speculation that there had been an explosive decompression – the aircraft may never have pressurised fully and the occupants, including the crew, passed out from hypoxia during the climb, which was when the last report from the crew was recorded.

The precise reason for the crash of John F Kennedy Jr's Saratoga may never be known because it did not carry a flight data recorder (FDR). But the US National Transportation



Despite the Falcon's good safety record, the Greek presidential aircraft accident was serious

Safety Board (NTSB) said there was no apparent technical fault in the aircraft when it was recovered from the sea.

The accident happened on a night approach over water in either IMC or marginal visual meteorological conditions (VMC), a classic combination of conditions for inducing sensory disorientation or "vertigo". Just after the aircraft had started its descent into Martha's Vineyard, local radar recorded it entering a 4,700ft/min (24m/s) rate of descent in a turn, before the signal was lost. Kennedy was a private pilot without an instrument rating, but had undergone an IMC familiarisation course to prepare him for unexpected encounters with deteriorating weather.

Stanley Roscoe of the US Crew System Ergonomics Information Analysis Centre says he believes that Kennedy's "graveyard spiral" was the result of a phenomenon known as "horizon control reversal", which has been studied and documented by aviation and ergonomics specialists for decades. In a conventional artificial horizon, it is the horizon line which moves relative to the pilot, whereas the aeroplane symbol is "fixed" – physically fixed in an electro-mechanical instrument – to the angle of the real aircraft. Therefore the pilot may perceive the aircraft as not moving in response to controls.

The situation that can lead to horizon control reversal occurs if the pilot perceives the horizon line – because it moves relative to him – as being the controllable symbol on the instrument. If one wing is low, the pilot's attempt to roll the horizon bar toward 'wings level' relative to the aircraft symbol, increases the aircraft's bank,

inducing confusion and sensory disorientation because the result is the opposite of what the pilot perceives it should be.

Many accidents have, or may have, been caused by this, Roscoe says, explaining that a potential modification to how artificial horizons operate could reduce the risk of it occurring. But the industry has failed to take up the issue. Although Roscoe's theory is that it would be better if the aircraft symbol were seen to respond more dramatically – relative to the pilot – to control inputs, he does not recommend the unadulterated "outside looking in" type of artificial horizon favoured in the former Soviet Union, particularly for military aircraft, in which the horizon is fixed relative to the real aircraft and the aircraft symbol is "flown", as it might be in a computer game, relative to the horizon bar.

HYBRID INSTRUMENT

His recommendation is a hybrid, in which the horizon bar 'moves' to stay true with the real horizon. The aircraft symbol also moves, in the correct roll direction, relative to the pilot, providing psychological reassurance that the aircraft itself is responding to control input. The trouble is that such a device depicts bank on the instrument as greater than it really is, so selection of a specific angle of bank would need to be a specially learned technique.

Other instruments have come in for criticism in the sense that they are, like artificial horizons, designed to aid the pilot but may end up putting him or her at risk. Around 69% of US Aircraft Owners and Pilots Association (AOPA) mem-

At the business jet end of the industry, where sales of aircraft have shown record buoyancy, participants need to worry, just as airlines do, about perceptions of their safety standards.

bers and 60% of avionics shop owners believe that Global Positioning System (GPS) satellite navigation moving map displays and other advanced avionics are contributing to the loss of basic pilot navigation skills.

AOPA President Phil Boyer, speaking at the recent Aircraft Electronics Association convention in Reno, Nevada, USA, said: "The new gee-whiz avionics on the exhibit hall floor at this convention are just the tip of the iceberg. It will not be long before many pilots, even of many single-engine aircraft, will enjoy terrain mapping, ground proximity warnings, collision avoidance, lightning strike data, radar returns

and near real-time weather graphics and text."

Avionics retailers are also concerned that pilots can buy a new avionics device, but there is no system for ensuring that they are trained to use it. They agreed that it is more difficult to learn to use modern avionics than traditional ones, but the shop owners and AOPA members differ on where the responsibility for training lies. Around 34% of AOPA members believed training was the pilot's responsibility compared with 11% of avionics shop owners. However, 36% of shop owners believe the shop should provide training, while 53% said that the avionics manufacturers should be

responsible for it.

Two-thirds of AOPA members who recently purchased a new GPS receiver said their avionics shop offered no help in learning to use it.

The NTSB estimated figures for all US general aviation in 1999 showed continuing improvements in both non-fatal and fatal accidents. The rate for all classifiable accidents was 7.05 per 100,000 flying hours, which is the lowest ever rate and compares with a rate of 10.9 in 1982. In the last three years, however, the improvement rate has slowed: it was 7.28 in 1997. For fatal accidents, the estimated 1999 rate was 1.26 per 100,000 flying hours. In 1982, for example, the rate was 1.99.

In 1999, the UK experienced an unwelcome upturn in light aircraft fatal accident numbers, with 15 fatal accidents compared with 10 in 1998. The situation reflects something of a plateau, however, because although 10 fatal accidents was the lowest ever number, it has been as low as that three times before, the first time in 1982.

WORLD TRENDS

Although the UK Civil Aviation Authority is reluctant to comment on most of the 1999 accidents because they are still under investigation, it observes: "Mountains had an influence in three of them and bad weather seems to have influenced at least three more. Take-off accidents, including practising for engine failure, account for five, and landing accidents for three. Loss of control, for whatever reason, seems to be a major factor in five of the accidents, and there was one mid-air collision."

New Zealand has carried out a wide-ranging analysis of its aviation safety trends, and it records the fact that the trend is worsening steadily for fixed-wing GA aircraft below 2.7 tonnes maximum take-off weight. In the third quarter of 1999 the all-accident rate for this category was running at 15 per 100,000 flying hours, twice the US rate of 7.28.

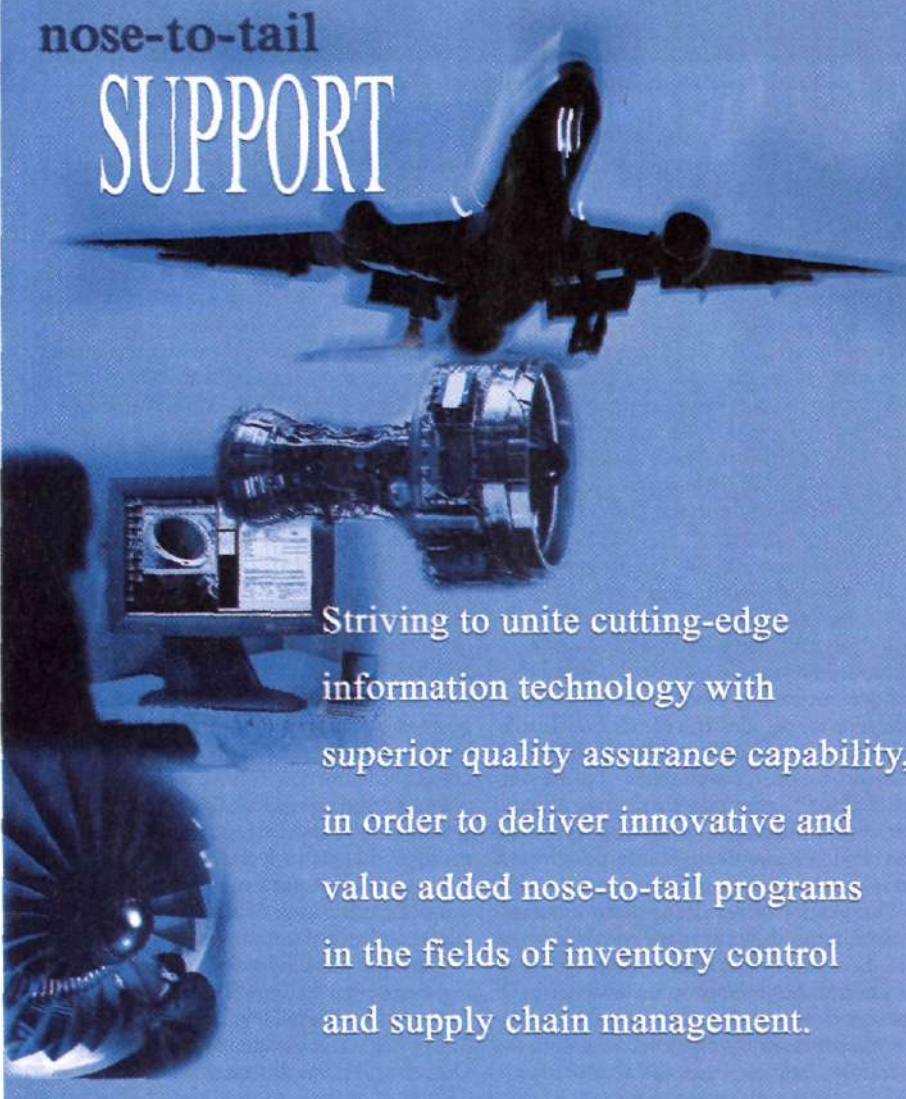
The news is better for aircraft in the 2.7-5.7 tonne band, the accident rate for which is improving fast, having been 20 per 100,000 flying hours in 1996 and dipping to just over 2 by late 1999. The overall GA accident rate, says the New Zealand CAA, is improving steadily, having shown just over 14 accidents per 100,000h in 1989 and reaching an estimated 8 in 1999. France has not presented rates or trends, but reports that in 1999 there were 162 accidents to private fixed wing light aircraft of which 21 were fatal, killing 37 people.

Although private GA will probably always remain unpredictable, indications are that aviation authorities and flying associations can persuade the industry as well as pilots to work at becoming safer.

Meanwhile at the top, business jet end of the industry, where aircraft sales have shown record buoyancy in recent years, the participants need to worry, just as airlines do, about the perceptions of their safety standards. □

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CORPORATE AVIATION ACCIDENTS AND INCIDENTS - TURBINE-POWERED AIRCRAFT

Individual corporate and privately owned jet-powered and turboprop aircraft accident details have been supplied by Airclaims from its *World Aircraft Accident Summary (WAAS)**, which it compiles and publishes on behalf of the UK Civil Aviation Authority. The *WAAS* also provides analysis by category under aircraft type, event, location and operator, and Airclaims also has an exclusive information exchange agreement with

the CIS Interstate Aviation Committee's Commission for Flight Safety.

Additional information is from *Flight International's* own sources.

Although we make every effort to ensure the listing of complete and accurate information, users should not employ the information for legal purposes or for precise statistical analysis. The availability of data is prejudiced by the fact that some companies in remote

regions to not fully insure aircraft and therefore do not report incidents resulting in damage.

The criterion for listing an accident or incident is that it involves fatality or serious injury to those on board or significant damage to the aircraft.

*Airclaims, Cardinal Point, Newall Road, Heathrow Airport, London, TW6 2AS, UK; tel: +44(20) 8897 1066, fax: +44(20) 8897 0300.

AA airfield approach/early descent

AAL above airfield level

ADC air data computer

ADF automatic direction finder

AF air force

ASI airspeed indicator

ATC air traffic control

C climb

Cgo cargo flight

C-B circuit breaker

CFIT controlled flight into terrain

CT crew-training flight

CVR cockpit voice recorder

Demo demonstration flight

DME distance measuring equipment

ER en route

FDR/DFDR flight data recorder/digital FDR

ECAM electronic centralised aircraft monitor

EFIS electronic flight instrument system

EICAS engine indicating and crew

alerting system

FAA US Federal Aviation Administration

Ferry ferry or positioning flight

FL flight level = altitude, expressed in hundreds of feet, with international standard pressure setting (ISA) of 1013.2mb set on altimeter

(eg: FL100 = altimeter reading of 10,000ft (3,000m) with ISA set)

FMS flight management system

G on ground

GPWS ground proximity warning system

HP high pressure

ILS instrument landing system

ISA international standard atmosphere =

sea-level pressure of 1013.2mb and standard temperature/pressure lapse-rate with altitude

L landing

LP low pressure

MTOW maximum take-off weight

NDB non-directional beacon

NTSB US National Transportation Safety Board

Pax passenger flight

PF pilot flying

PNF pilot not flying

Pvt private flight

RA runway/final approach

RVR runway visual range

VFR visual flight rules

VHF very high frequency

VMC visual meteorological conditions

VOR VHF omni-range navigation beacon

TO take-off

T test flight after maintenance

Conversion factors

1nm=1.85km; 1ft=0.3m; 1kt=1.85km/h

Manufacturers

Aerospaciale Corvette, Socata TBM700

Raytheon Beech King Air series, Baron series, Beechjet

Bombardier Learjet series, Challenger series

British Aerospace BAe (HS) 125 series, BAe (HS) 748

Cessna Citation series, Conquest series

Dassault Falcon series

De Havilland Canada Twin Otter series

Embraer EMB-110 Bandeirante, EMB-120 Brasília

Fairchild Metro and Merlin series

Gulfstream Gulfstream series

Israel Aircraft Industries (IAI) Astra series,

Westwind series

Mitsubishi Mu-2B

Partenavia Spartan

Pilatus Britten-Norman

Islander series

Piper Aerostar, Cheyenne series, Saratoga, Seneca

Rockwell Commander, Sabreliner

CORPORATE AVIATION ACCIDENTS LIST - TURBINE-POWERED AIRCRAFT

Date	Type	Registration	Operator	Location	Flight Phase	Fatalities	Injuries	POB	Circumstances
January									
11	Mitsubishi Mu-2B-60	N95MJ	Mag Marketing	Engelsbach apt, Frankfurt, Germany	RA	-	-	2	Check ride for new owner/pilot. Report is that on short finals the pilot pulled throttles back to ground idle and the aircraft touched down very hard. The aircraft was a total loss.
12	Commander 1000	N20GT	Franklin Research	Pilwaukee apt, Wheeling, Ill, USA	L	-	-	4	Very hard touchdown. Approach was flown by the owner under direction of the pilot. There was a 10kt tailwind and the airframe had some ice contamination.
14	Beech King Air 300	N780BF	USA Healthcare	Nr Folsom Field, Cullman, Ala, USA	C	2	-	2	After being cleared to land from an NDB approach to runway 20 in daylight IMC, with weather reported as 3km visibility in fog, scattered cloud at 200ft (60m), broken cloud at 700ft and overcast at 2,400ft, the pilot stated that he was carrying out a missed approach. That was the last contact with the aircraft, which crashed 5km north west of the airfield.
22	Cessna Citation VII	N782QS	Exec Jet Aviation	Port Columbus apt, Ohio, USA	L	-	-	2	Right main gear collapsed when the aircraft's weight settled on it.
February									
5	Cessna 182	N54FC	RO Farms	Nr Ozona, Texas	C	5	-	5	Crashed about 5km beyond the runway end after take off in night VMC.
7	Cessna 210	CP-1610	Aero Taxi Capesi	Trinidad, Bolivia	RA	6	1	7	Went out of control on final approach in daylight VMC.
7	Beech King Air C90	N74CC	Hart Corporation	Mercer apt, New Jersey, USA	L	-	-	5	One of the main gear tyres seems to have failed, the right main gear separated.
10	Beech King Air 200	N680CB	Canterbury Bus	Regional apt, Cedar City, Utah, USA	L	-	-	3	Gear collapsed during landing roll.
16	Gulfstream II	N711TE	Trans Exec	Van Nuys apt, Los Angeles, USA	L	-	-	4	The aircraft overran the runway by about 300m having landed long and fast on runway 16R in daylight VMC. It collided with a number of small aircraft.
19	Beech King Air C90	C-GSAX	Slave Air	6km W of Slave Lake, Canada	AA	-	-	2	During the first approach in darkness the aircraft was poorly lined up for the runway, so the co-pilot carried out a go-around. The captain took control, but while circling to position for another approach flew into the lake's frozen surface.
28	Piper Cheyenne II	C-FCEC	CEC Flightexec	Timmins apt, Ontario, Canada	TO	-	-	3	During a daylight take-off in snowy conditions the pilot lacked visual cues for the runway centre, the aircraft drifted left and the port propeller hit a 0.6m high snow bank, which caused it to drift further left until the other propeller also hit the bank. RVR was 5,000ft (1,520m) in light snow, and the surface of the runway centre had been sanded over shallow, loose snow.

CORPORATE SAFETY

Date	Type	Registration	Operator	Location	Flight Phase	Fatalities	Injuries	POB	Circumstances
March									
12	Mitsubishi Mu-2B-20	N176BJ	Hartford Holding	McGhee Tyson apt, Knoxville, USA	L	-	-	3	Right engine lost power after the aircraft levelled at 4,500ft, and the pilot shut it down and feathered the propeller. Simultaneously, the aircraft had a complete electrical failure. On returning to Knoxville, the pilot selected the gear down but the aircraft landed with the gear up.
13	Socata TBM700	N700SP	Volare Aviation	Regional apt, Winchester, Va, USA	L	-	-	2	Pilot, distracted by other traffic, forgot to lower the undercarriage. When the warning horn sounded, the pilot did not hear as he was talking to his passenger.
20	Piper Cherokee Six	HK-1603P	SADI Colombia	8km SW of Ataco, Colombia	ER	6	-	7	Flew into the side of a mountain.
25	Cessna Citation II	N37MH	Charlie Brown Air	State College, Pennsylvania, USA	L	-	-	2	Gear reported to have collapsed on landing.
30	Learjet 35A	N508GP	Piedmont Hawthorne	Rogers Municipal apt, Ark, USA	RA	-	-	10	Undershot the threshold of runway 19 by about 5m in good daylight weather with wind 150°/13kt gusting 19kt. Left main gear was damaged by approach lighting and collapsed.
April									
7	Learjet 24D	PT-LEM	Manaca Taxi Aereo	Leite Lopez apt, Ribeirao Preto, Brazil	L	5	-	5	During an intended touch-and-go for crew training, the aircraft touched down in an "abnormal" attitude, one of its wings struck the runway and the aircraft crashed and caught fire.
17	Beechjet 400	N400VG	Vecellio & Grogan	Beckley apt, West Virginia, USA	L	-	6	8	Overran runway 28 during a daylight landing in slight rain, and fell down a steep slope into trees. The aircraft seems to have landed long on the 1,520m runway.
18	Cessna 206	ZK-EKJ	Waterwings Airways	Mt Suter, Milford Sound, New Zealand	ER	5	-	5	The sightseeing flight crashed into the eastern face of Mt Suter about 180ft below the 6,900ft summit. The weather was generally good but cloud was forming over high ground.
22	Let 410UVP	YV-956C	Edgar Lacruz	Nr Caen, France	ER	-	2	3	En route at 3,000ft under VFR between Sweden and Porto, Portugal both engines lost power within a short time of each other. The pilot force-landed straight ahead. It was determined that an unapproved auxiliary fuel supply in drums in the cabin had not supplied fuel to the main tanks at the correct rate.
24	Pilatus Turbo Porter	4X-AIY	Sky Club	Nr Habonim, Haifa, Israel	C	4	6	10	Climbing through about 300ft after take-off, the engine made an unusual noise and stopped. The aircraft crashed on a low hill.
May									
9	Cessna 205	N8157Z	Grand Lake Skydiving	Nr Celina, Ohio, USA	C	6	-	6	The engine failed soon after getting airborne, and the aircraft entered a flat spin from which it did not recover.
14	Beech King Air B100	N924RM	Executive Leasing	Hickory apt, NC, USA	L	-	-	4	Right main gear failed to extend, and eventually the pilot decided to land with only the left main and nose gear down. The aircraft made a night landing and slewed off the runway into a ditch.
17	Curtiss C-46F	CP-1319	CAMBA	Nr El Paraiso Ranch, Beni, Bolivia	RA	-	-	2	During the approach to the airstrip at the El Paraiso Ranch, one of the engines began backfiring so the pilot shut it down and feathered the propeller. The aircraft was unable to maintain height and the pilot carried out a forced landing on marshy ground.
17	Beech 99A	N133BA	Bemidji Airlines	Beltrami County apt, Minnesota, USA	L	-	-	1	During a test flight the gear travelling warning light remained on. Recycling did not work and when the gear was selected down it did not respond. The pilot pumped the gear down manually, and a fly-by over the tower brought confirmation that the gear appeared down even though there was no green for the left main gear. The left main gear collapsed on landing.
21	Pilatus Turbo Porter	N338CC	North Platte Express	Shively Field, Wyoming, USA	L	-	-	2	During a training touch and go, the left main gear failed.
22	Beech King Air B90	N301DK	Pacific IntSkydiving	In sea off Mokuleia, Hawaii	AA	1	-	1	The parachutists had jumped as planned and the aircraft was seen to begin a descending turn toward the shore, but the descending turn continued until impact with the sea.
24	Mitsubishi Mu-2B-40	N701K	Lucky Landings	6km N of Perry Sound, Canada	TO	2	-	2	Crashed immediately after take off in darkness and IMC.
24	Commander 690B1	N840V	KV Oil & Gas	Ingalls apt, Hot Springs, Virginia, USA	L	-	-	1	Touched down hard on its left main gear and bounced. On settling again the left main gear collapsed. There was a strong and gusting crosswind from the left.
June									
12	Beech King Air C90	N369GA	Eastway Aviation	White Plains, NY, USA	TO	-	-	4	Collided with a deer during take off run. Nose gear failed.
14	Beech King Air 100A	C-GASW	Thunder Airlines	Thunder Bay, Ontario, Canada	C	-	-	5	Crashed shortly after take off from runway 30 at Thunder Bay.
16	Commander 690B1	N480K	SB Aircraft Sales	Peninsula apt, Calif, USA	L	-	-	5	Main gear collapsed on landing.
22	CASA 212-100	F-GCBP	Euparie Boogie Perf	La Garenne apt, Agen, France	C	2	-	2	During the climb with 15 parachutists on board the crew reported a technical problem. The parachutists jumped safely from 9,800ft, but during final approach to Agen the aircraft lost height fast and crashed 500m short of the runway.
25	Beech King Air C90	N221NC	Stone Aviation	Mineral County apt, Creede, Colo USA	L	-	-	7	Hard touchdown on right main gear which collapsed.
25	Beech King Air C90	N3019W	Aerocenter	Nr Munson, Florida, USA	ER	2	-	2	En route from Zephyrhills, Florida, to Mobile, Alabama, the pilot reported that he was descending to 11,000ft and asked to deviate to the north to avoid weather. Shortly after this the pilot reported that he was "out of control and going down".
30	Beech 99	D-IBEX	NightExpress	Nr Liege, Belgium	ER	2	-	2	Crew advised that they had a mechanical problem and could not maintain height, but accepted radar vectors for Bierset apt near Liege. The aircraft crashed short of the airfield.
July									
1	Learjet 60	N219FX	Bombardier Bus Jet	Barnstable apt, Hyannis, Mass, USA	L	-	-	2	Crew announced a hydraulic problem on approach but continued with the landing, which overran the runway. Inspection revealed that the left and right main gear actuator hydraulic line connectors had not been tightened properly and were leaking.
1	Shorts Skyvan	N51NS	Summit Air Charters	Rusty Springs airstrip, Yukon, Canada	L	-	-	2	Right main gear collapsed when rear spar of the gear-mounting stub-wing failed.
1	Piper Cheyenne II	N602RM	Unidentified	Nr Deerfield, Virginia, USA	AA	1	-	1	During the descent for Shenandoah Valley regional airport, Staunton, the aircraft appears to have gone out of control. There was no indication passed to ATC of any problems.
3	Beech King Air 100	N577D	Atlanta Aircraft	Marsh Harbour, Bahamas	L	-	-	8	Landed with gear retracted.
7	Dassault Falcon 20	G-FRAU	FR Aviation	Nr Florennes, Belgium	ER	-	-	2	Severe icing at 15,000ft. Pilot started a descent to clear this but encountered heavy hail. Minor damage, but the aircraft landed safely.
9	BAe (HS) 125-1	XA-TAL	Aerojet Express	Toluca apt, Toluca, Mexico	RA	4	-	4	Hit the ground 350m short of the runway during a night ILS approach in reducing visibility estimated at about 1.5km at the time. The aircraft was operating a flight for DHL.

Date	Type	Registration	Operator	Location	Flight Phase Fatalities Injuries POB	Circumstances
24	Piper Cheyenne III	TC-FAH	THK Turkish Air Taxi	Esenboga apt, Ankara	L - - 2	Nose landing gear collapsed on landing.
28	Beech King Air A90	RP-C990	Lepanto Mining	Mt Namogioan, Philippines	ER 8 - 8	Flew into the side of a mountain about 20km from the destination in daylight but overcast skies after the pilot had requested weather details.
28	Fairchild Metro III	SX-BGG	KAL - Calavia	In sea off Rhodes, Greece	RA - - 2	Lost power on both engines during a night approach from Athens to Diagoras apt and ditched just off the coast.
31	Beech King Air A90	N518DM	Parahawks Skydiving	Marine City apt, Michigan, USA	C 10 - 10	Having climbed to about 200ft the aircraft entered a steep descending left turn continuing until impact.
August						
3	Piper Cherokee Six	HC-AKO	Negocios Ind	Guayaquil, Ecuador	C 5 - 5	Engine lost power soon after take off, and the aircraft struck a telegraph pole during the attempted forced landing. The aircraft crashed and caught fire.
7	Beech King Air 200	N5UN	Eastway Aviation	White Plains, NY, USA	L - - 1	Gear problems during approach. Landed with gear up.
10	Cessna 414	N373BC	Gibalco Air Services	Nr Roberts apt, Monrovia, Liberia	RA 6 - 6	Crashed and burned about 4km short of the runway in night VMC.
12	Cessna 206	N193GE	Greystoke Eng	Nr Hillsborough, New Hampshire, USA	C - - 1	Fuel began to leak fast shortly after take-off from the cabin auxiliary fuel tanks fitted for a ferry flight. The leak was filling the cabin floor so fast that the pilot elected to make a forced landing. Soon after the aircraft came to rest the aircraft caught fire.
16	Fairchild Metro III	N2671V	Merlin Express	San Antonio apt, Texas, USA	L - - 2	Crew forgot to lower landing gear during a crew training exercise while simulating a hydraulic failure.
17	DHC Twin Otter 300	9XRKD	Alliance Express	Airstrip nr Lobutu, Zaire	RA - - 2	The pilot used GPS to break cloud and was looking for a widened section of a road which was used as the airstrip, but landed on a narrow part which had embankments which the wingtips hit.
17	BAe 125 Srs 600	N454DP	DP Air LLC	McCarran apt, Las Vegas, USA	L - - 8	Just before take off the crew felt a violent vibration, but the take-off was completed safely and the gear retracted. Hydraulic pressure began to reduce, but the pilot elected to continue to destination. There was no response on selecting gear down, however, so the aircraft was landed with gear up. It was found that the right inboard main gear tyre had shed tread which damaged the hydraulic lines in the wheelwell.
17	Challenger 600	N63HJ	Hop A Jet	Executive apt, Florida, USA	L - - 3	When the nose-gear was lowered onto the runway after a safe touch-down, the aircraft veered left off the runway.
20	DHC Turbo Otter	N888K	Ketchum Air Service	Unknown	TO - - 4	During a water take-off, when the aircraft was "on the step", the pilot inadvertently retracted the flaps and elected to abandon the take-off. The aircraft failed to stop before reaching the lake shore and its floats were torn off on the beach.
25	Beech King Air F90	F-GIFK	Avdef	In flight, nr Nantes, France	ER - - 2	The crew encountered a severe hailstorm which caused serious damage, but the aircraft landed safely.
29	Learjet 35A	N350JF	Sandgate Inv	Nr Adwa, Ethiopia	ER 2 - 2	The aircraft is believed to have been brought down by Ethiopian anti-aircraft fire after penetrating Ethiopian airspace south of Asmara, Eritrea.
September						
1	Cessna 404 Titan	5HC-NAT	Northern Air	Mt Meru, Nr Arusha, Tanzania	AA 12 - 12	Hit the southern slopes of Mt Meru at 8,800ft early in its descent to Kilimanjaro airport, about 20km from the airport. Mt Meru was in cloud, but conditions were mainly VMC. The flight was operating under VFR.
2	Piper Cheyenne II	ZP-TYI	ITAIPU	Colonia San Pedro apt, Paraguay	L - - 2	The aircraft veered off the rough airstrip after a normal touchdown in VMC.
3	Cessna 404 Titan	G-ILGW	Edinburgh Air	Linwood, nr Glasgow, Scotland	C 8 3 11	Soon after take off the aircraft went out of control and crashed. The aircraft was near its maximum take off weight, and witnesses report that at least one engine was "spluttering" and that one of the propellers was turning slowly during the descending turn to impact.
3	Beech King Air B90	N338AS	CP Horizons Corp	West Palm Beach, Florida, USA	RA 8 - 8	The pilot broadcast a "mayday" before the aircraft crashed about 1km short of runway 13 in night VMC at Palm Beach International airport. The pilot appears to have diverted to Palm Beach because it was not the aircraft's original destination, but no reason for requesting a landing at Palm Beach had been given.
5	Cessna 208B	LN-PBB	Hangar 5	Sumburgh apt, Scotland	L - - 2	The aircraft landed long and fast. It became apparent that an overrun was likely so the captain made a last-minute attempt at a go-around, but it was too late. The aircraft overran onto the concrete blocks which provide the sea defences at the runway's end.
9	Beech King Air 200	F-GIAL	Aif Air	Carpiquet apt, Caen, France	RA - - 3	Unconfirmed reports suggest that the captain chose to carry out a late go-around in bad weather and called for flaps to take-off, but that the co-pilot inadvertently retracted the flaps. The aircraft lost height and touched down hard, causing the gear to fail.
11	Beech King Air 200C	C9-ASX	LAM	Jan Smuts apt, J'burg, S. Africa	L - - 8	Gear collapsed on landing.
14	Dassault Falcon 900	SX-ECH	Govt of Greece	Nr Giurgiu, Romania	AA 7 1 13	Aircraft went out of control at about 23,000ft, porpoising violently in its decent during which seven passengers were killed by being thrown around or by being struck by flying objects. The aircraft recovered to land at Bucharest Airport. An interim report by Greek official investigators in advance of the official Romanian report alleges that the accident was caused by a known pitch feel system malfunction resulting from failure to fit an approved system modification.
16	Commander 500S	TG-RBK	Procafe	Nr La Tinta, Guatemala	RA 6 - 6	Aircraft hit the ground about 300m short of a farm strip and was destroyed.
18	Cessna 182	N4803D	Ags Over Texas	Coulter Field, Bryan, Texas, USA	C 5 - 5	Climbing through about 450ft in daylight VMC after take off for a parachutist drop, the aircraft banked right, nosed down and went out of control.
19	Beech King Air 200	YV-385CP	CAV	15km SW of Bimini, Bahamas	ER 1 - 1	After the pilot had advised Miami ATC of an emergency, the aircraft crashed into the sea in daylight VMC.
25	Piper PA-31-350	N-411WL	Big Island Air	Mt Mauna Loa, Hawaii	ER 10 - 10	The aircraft crashed into Mt Mauna Loa at about 10,500ft AMSL while on a daylight sightseeing flight from Keahole-Kona airport.
25	Learjet 36	OE-GMD	Air Med	Langenlebern AFB, Tulln, Austria	L - - 4	Overran runway 08 at Tulln by about 200m in daylight with a 1,400m dry runway. Reports suggest that the landing was conducted with a tailwind.
26	Learjet 24	N224SC	Dolphin Aviation	Gainesville apt, Georgia, USA	L - 2 5	Overran 1,220m runway 29 in daylight VMC. There was a 6kt tailwind.
October						
4	Socata TB-10 Tobago	OB-1483	Servicios Turisticos	In sea of Pisco, Peru	ER 5 - 5	Crashed into the sea about 3km from the airport after taking off from Pisco in rain, fog and strong winds.

Date	Type	Registration	Operator	Location	Flight Phase Fatalities Injuries POB	Circumstances
5	Beech King Air 200	N280MS	Durham Aircraft	Mt Berlin, Mass, USA	C 2 - 2	Flew into the side of the mountain at the 2,300ft level about 4min after a night IMC take off from runway 29 at Harriman and West Airport, North Adams, around 8km to the west. The aircraft had been cleared to climb to 5,000ft and to expect clearance to FL220. Shortly before the impact the pilot had asked for confirmation that ATC wanted the flight to level at 2,200ft.
11	Fairchild Metro III	N438MA	Merlin Express	Opa Locka apt, Florida, USA	L - - 2	The co-pilot, who was flying the aircraft, moved the throttles to flight idle but got ground idle. The sink rate caused a hard landing with a bounce, and the aircraft veered to the right off the side of the runway. Night time VMC conditions.
13	Cessna Caravan I	N1117G	Skylink Express	Lake Erie, Ontario, Canada	ER - - 2	There was a loud bang during the cruise and the propeller stopped. The crew shut down the engine and carried out a forced landing in the lake in darkness.
15	Cessna Caravan I	C-FKSL	Wasaya Airways	Ranger Lake, Ontario, Canada	AA - 1 1	While holding over Ranger Lake for special VFR clearance into the Red Lake control zone the aircraft flew into the "glassy" surface of the lake while avoiding a flock of birds. The pilot says that he did not know how low he was.
15	Mitsubishi Diamond I	I-VIGI	Aeroitalia	Nr Parma, Italy	RA - 1 8	On an ILS approach to Parma, the aircraft hit the ground in thick fog 3.5km short of the runway.
24	Learjet 35A	I-AVJG	Avioreprese Jet Exec	In sea, 12km S of Camogli, Italy	RA 3 - 3	The aircraft crashed into the sea on approach to Genoa in daylight but poor visibility with low cloud and rain.
25	Learjet 35	N47BA	Jet Shares One	Nr Mina, S Dakota, USA	ER 6 - 6	Radio contact was lost about 20min after departure from Orlando, Florida, while the aircraft was climbing through FL370 for its cleared flight level of 390, heading north west. The aircraft failed to turn onto a cleared westerly heading and flew on its original heading, apparently until it ran out of fuel, when it entered a steep descent and crashed near Mina. Cruising height varied between 22,000ft and 51,000ft for about 4h before descending. Military aircraft called to investigate the flight flew alongside, the pilots reporting that the Learjet's windows were "fogged", but there was nothing visibly wrong with the aircraft. The aircraft had been bound for Dallas.
November						
11	Beech King Air 200	N869	Jaymar Ruby	Meigs apt, Chicago, USA	C 3 - 3	Crashed into Lake Michigan immediately after a night take-off in VMC. Witnesses have reported that the take off run was unusually long and that the aircraft sounded "different".
20	Cessna Caravan II	D2-ECQ	Aviacao Ligeira	Gen Deslandes apt, Benguela, Angola	L - - 5	Nose gear collapsed during the landing roll.
24	Cessna 206	VX-XGR	Karumba	In sea nr Mornington Is, Australia	C 6 - 6	Wreckage suggests that aircraft impacted the sea at high speed. Daylight but poor weather. Last contact with the aircraft was as it reported passing 3,500ft climbing to 5,500ft having taken off from Mornington Island for Normanton.
26	Cessna Caravan I	5Y-RAN	Aircraft Leasing	Nairobi Intl apt, Kenya	C 4 - 4	Aircraft crashed just after take off in the darkness with fog.
27	DHC Dash 7	N273EP	Raytheon Range	Bucholz airfield, Marshall Is	L - - 18	Nose gear failed to indicate down when gear was selected. Nose gear collapsed on landing.
27	Beech King Air A90	N866A	Big Sky Adventures	St George apt, South Carolina, USA	ER - - 1	Power started to reduce at 12,500ft. The pilot instructed the parachutists to jump and he attempted recovery to the airport, but could not maintain height. The aircraft touched down about 500m short of runway 5.
29	Beech King Air C90B	N568SA	Euroflight	Charalave apt, Charalave, Venezuela	L - - 1	The brand new aircraft was being ferried to the Dominican Republic, but the pilot flared too early and touched down hard, causing damage.
December						
6	Cessna Caravan I	N5187B	Arctic Circle	Bethel apt, Alaska, USA	C - - 2	When the pilot retracted the flap as the aircraft climbed through 200ft the aircraft could not maintain height, and it touched down again on the runway about 60m from the end, overrunning and suffering serious damage.
6	Piper PA-31-350	ZS-OJY	Flightline	Rand apt, Johannesburg, S Africa	C 10 - 10	Lost height and crashed shortly after take off from runway 29. The pilot reported the loss of the right engine, initially requested a left turn to land on 29 but then announced that he would have to force-land. The inquiry established that the aircraft was overloaded, and that the power loss was caused by a failure in the exhaust system which is connected to the turbocharger manifold.
7	Cessna 207	N1747U	Grant Aviation	80km W of Bethel, Alaska, USA	ER 6 - 6	The aircraft disappeared and was later found on the tundra approximately on its track between Bethel and Nightmute.
9	Cessna CitationJet	N525KL	College of Ozarks	Point Lookout, Missouri, USA	AA 6 - 6	During a daylight GPS approach to runway 11 at Point Lookout, the aircraft flew into a hill in IMC about 6km short of the threshold.
9	Piper Navajo	SE-GDN	Twin Air	Gammeldammsberket, Sweden	C 8 - 8	Just after take off from Sundsvall for Goteborg in snow and strong winds the pilot reported that he was "having trouble with his compass". The aircraft crashed 25km N of Sundsvall.
12	IAI Westwind	N50PL	Lahaye Laboratories	Nr Gouldsboro, Pennsylvania, USA	AA 3 - 3	During the night descent into Teterboro Airport, the crew gave no indication of any problems, but the aircraft impacted the ground in a steep dive.
16	Piper Cheyenne	N919RD	Robert Denison	Nr Santa Fe, New Mexico, USA	C - - 3	The pilot reported a partial loss of power. The aircraft could not maintain height and force-landed.
19	Beech King Air E90	?	Uni of S California	Nr Beaufort, S Carolina, USA	RA 1 1 2	Undershot runway 24 during a night surveillance radar approach in conditions which were technically night VMC but not good.
21	Cessna Citation I	N1218S	McMahan Ents	Crisp County apt, Cordele, Ga, USA	C 1 - 1	Hit trees during go-around after a localiser-only approach to runway 10 at Cordele in darkness with low cloud and mist.
23	Cessna Caravan I	N1315A	M&N Aviation	Nr Ajuntas, Puerto Rico	ER - 1 2	With a lowering cloudbase, the aircraft struck trees on a hillside at the 2,500ft level while attempting to stay in VMC.
26	IAI Westwind	N422BC	Bradley Aviation	Gen Mitchell apt, Milwaukee, USA	G - - 6	Carrying out the checklist during taxiing for take off, the co-pilot opened the oxygen shut off valve, saw sparks and heard a "popping" sound. A flame erupted from the area of the valve, and the crew brought the aircraft to a halt and evacuated the passengers. The fire spread and eventually destroyed the aircraft.
28	Cessna Caravan I	C-FGGG	Seair Services	Nr Abbotsford, BC, Canada	C - 3 6	When the pilot retracted the flaps on climbing through 400ft, the aircraft went out of control. The pilot crash-landed it in a field.
31	Beech 99A	N491BB	Bohike Airways	St Barthelemy apt, Guadeloupe	L - - 8	The aircraft yawed to the left on touchdown and ran off the side of the runway. The pilot reported that the gear indicators showed fully down, ground witnesses report that the left main gear leg was moving.

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Pilots' salaries could follow those in the IT sector

I've just read the letter "Joy and tears of an experienced airline pilot" and couldn't help smiling. While I'm currently training for my ATPL, I do have 12 years' experience in the IT industry and several thousand hours at the controls of a PC. The relevance being that from where I sit the same thing is about to happen in the airline industry as happened in the information technology industry in the late 1980s and 1990s, culminating in the frenzy for good qualified people to do the increasing amounts of work required approaching the year 2000.

The laws of supply and demand will take over and the conditions of employment will take a leap far beyond any employer's imagination. The tables are about to be turned. Salaries will increase at a rate that will make the human

resources departments' eyes pop out and pilots themselves will find themselves the target of employment agencies' head hunters. The average IT consultant these days earns five to six times the national average annual salary and many if not most are self-employed. In the even more rarified environment of aviation the demand is going to outstrip the supply to such an extent that pilots will most likely find themselves in 10 to 15 years time earning six to eight times the national average. The idea of a pilot on an annual salary of £120,000 (\$177,500) in today's terms will not be unusual. For those who break loose and contract their services the benefits may be much larger.

There is an even more worrying downside for the airlines. In an environment where filling vacancies means

the difference between being able to operate their business and not, they will lower their standards to such an extent that people who aren't suited to the job will get through. I've lost count of the number of people in the IT industry I've worked with who were on high salaries but incapable of doing what they said they could do.

While the checks in flying are much more rigorous and the analogy is not directly relevant, the situation will happen in some form.

As someone who at 34 is just embarking on my airline career all this looks very inviting and I'm looking forward to it enormously. Of course I have the benefit of hindsight, which seemingly the airlines do not.

NICK WILLIAMS-HOWES
via e-mail

Who needs an engineer?

I am a recently qualified CAA A & C licenced engineer with basic practical experience, and I constantly read letters and articles regarding the lack of licenced aircraft engineers within the aviation industry. In that case, why do I (and many other of my licenced qualified colleagues) find it impossible to find a position within an approved organisation?

It is very disheartening to work so hard, for so many years, to gain a professional qualification which is proving useless to us.

A lot of time and effort has been applied to gaining this qualification, which got to the point of "what we didn't know about aircraft, wasn't worth knowing about", and now I am seriously starting to lose interest in engineering due to the lack of response.

It makes me angry that this is

the case, a lot of people have worked so hard to get their licences, and for what? Although I have basic practical experience I am very keen to join an organisation and learn my trade, but how can I keep my confidence up when every week for the last six months I have been knocked down again?

I would like to know why I cannot find a job even though I have a CAA LWTR, and why so many organisations are ignoring the fact that the future of the industry will rely on people like myself. I would like to hear views on this from anyone interested.

MARTIN GILES L.A.E
Leatherhead, UK

Getting on the pilot ladder

I'd like to thank you for your wonderful magazine, being one of the first aviation organisations to

voice concern over the looming crisis of a worldwide shortage of commercial pilots.

As an 18-year-old A-Level student and qualified private pilot wishing to embark on a career in commercial aviation, I have found little encouragement as I have contacted many aviation organisations with regard to the best way of achieving my goal. I would like to know if other budding aviators have encountered similar difficulties in obtaining guidance from those 'in the know'.

There seems to be few operators actually offering any form of sponsorship to prospective students at the moment. Is this situation likely to improve, or will I be old and grey before my career gets off the ground?

If you, or any of your readers, can offer me a shred of hope or encouragement, I would be most grateful.

KIRSTY E KAY
Derbyshire, UK

The opinions on this page do not necessarily represent those of the editor. Flight International cannot undertake to publish letters without name and address and reserves the right to select or edit letters. Address: The Editor, Flight International, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS, UK. E-mail: flight.international@rbi.co.uk

FLIGHT

THE AIRCRAFT ENGINEER
AIRSHIPS

75 YEARS AGO

Extracts from *Flight*, May 28, 1925

Round-Germany Flight

That a vanquished country like Germany should be able to get together more than 90 machines for such a competition gives one food for thought. In this country, which is sometimes supposed to have won the War 1914-18, it is difficult to scrape together half-dozen machines to compete for a few small prizes, but in Germany the authorities seem to grasp the importance of encouraging the aircraft industry, and we think it can be said that the "Deutscher Rundflug 1925" marks the beginning of Germany's effort in the air, which will doubtless be redoubled as soon as that country has been released from the restrictions with which she is surrounded. It would be well if our own authorities, having realised that Germany "means business", and that she will strain every nerve towards "peaceful penetration" in the air, no less than in other spheres, took the necessary steps not to be left behind.

The North Pole Flight

Weather conditions having improved, on May 21, at 5:15 p.m., Captain Amundsen left King's Bay, Spitzbergen, on his flight to the North Pole. Capt. Amundsen's machine - an Italian-built "Dornier" flying-boat, fitted with two Rolls-Royce "Eagle" IX engines - was the first to get away, followed by the second sister machine, with Lieutenant Dietrichsen in charge... It was stated originally that the flight should take eight or nine hours to accomplish, and it was apparently Amundsen's intention to land at the Pole, if possible, for about 24 hours and then return to Spitzbergen. In that event he should have been back at noon on Saturday, May 23, but up to the time of writing no news has been received of Amundsen and his companions - for it should be pointed out that at the last moment the wireless equipment was discarded in favour of extra fuel.

Aerial Survey of England

Aerial survey has just made an important advance in this country, for we understand that the Aircraft Operating Co., Ltd., of 8, New Square, Lincoln's Inn, W.C.2, have had a tender accepted for the carrying out of an experimental air survey on behalf of the Ordnance Survey Department, with a view to ascertaining its applicability to the revision of the 25-in. maps of England.



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Sir Rodney Birdseed: "So what are your recommendations from the network-wide strategy rethink?"

Nigel Thinktank:

"Well, for a start, you need a new brand identity, while still preserving the 'British' for customer loyalty. We suggest you

change *Airways* to words defining the routes served. So you could have *Midland* for the main national routes, *Regional* for the outlying feeder routes, *European* for the continental ones, *Mediterranean* for the routes down to the Middle East, and *World* for the long-haul. Hey presto, a whole new image!"

Birdseed: "I can just think of one small problem..."

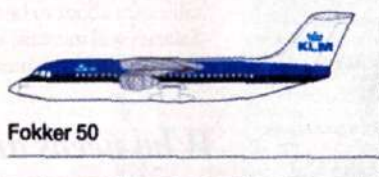
Uncle Roger's Total Aviation Bookshelf

Hidden Victory, by Air Vice-Marshal A G Dudgeon: Tempus Publishing, The Mill, Brinscombe Port, Stroud, Gloucestershire, GL5 2QG, UK.

Sub-titled *The battle of Habbaniya*, this is the story of the May 1941 defence of the besieged Habbaniya airfield in Iraq by the instructors and pupils of the RAF's No 4 Flying Training School against

Lockheed Martin F-16, McEntire ANGB, South Carolina

first, local Iraqi "rebels", and then the Germans who were supporting them. It's a tale of fire-fighting and improvisation based on superannuated and/or inappropriate equipment



Fokker 50

Airtime (KLM uk)

(Fairey Gordon, Hawker Audax, Gloster Gladiator and Airspeed Oxford) - who ever thought of an Oxford fitted with racks for eight 20lb bombs, for instance? And army reinforcements were delivered by Vickers Valentia... **Defences:** previously unrecorded/forgotten battle, told by somebody who took part; unique pix; **Seiges:** No index; poor pic reproduction; definitely one man's view of history;

TAB Rating [X] Middle Shelf

■ That Hercules (S&L23-29 May) was at FIDAE, in Santiago, Chile, in 1992, thinks Nephew Chris Brown, who just might be the bloke behind the bubble.

■ Ex-top-Birdseeder Bob Ayling told the Aviation Club of the UK at his ex-Dome that there's no technical advance now that provides the excitement things like jet engines, radars and computers used to: "You'd need a widebody jet travelling at Mach 2 powered by orange juice to get that sort of effect..."

Bob Ayling



Gloster Meteor F4, Tangmere, August 1946

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CIT PUBLIC AUCTIONS

BOEING 747-200B

Aircraft will be offered for sale by The CIT Group/ Equipment Financing, Inc. The sale will be held on Friday, July 14th, 2000 at 11.00am at the offices of Schulte Roth & Zabel LLP, 900 Third Avenue, 23rd Floor, New York, NY 10022 - Michael C. Mulitz (212) 756-2532.

Manufactured: 1971
Registration: N607FF
Serial Number: 20011
Total Hours: 86,281
Total Cycles: 23,470
Engines: JT9D-7J
TOW: 800,000lbs
Seating: 45J, 426Y

BOEING 747-200B

Aircraft will be offered for sale by C.I.T. Leasing Corporation. The sale will be held on Friday, July 14th, 2000, at 2.00pm at the offices of Schulte Roth & Zabel LLP, 900 Third Avenue, 23rd Floor, New York, NY 10022 - Michael C. Mulitz (212) 756-2532.

Manufactured: 1977
Registration: N624FF
Serial Number: 21439
Total Hours: 67,137
Total Cycles: 14,959
Engines: JT9D-7J
MTOW: 800,000lbs
Seating: 45J, 426Y
Notes: Recent "C" check

For inspection, aircraft specifications and terms of sale, please contact Brian Charmatz at CIT at (212) 536-9386, fax (212) 536-9401.

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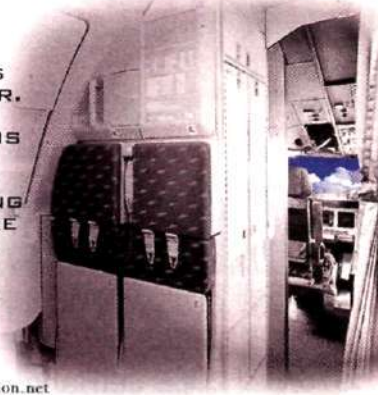
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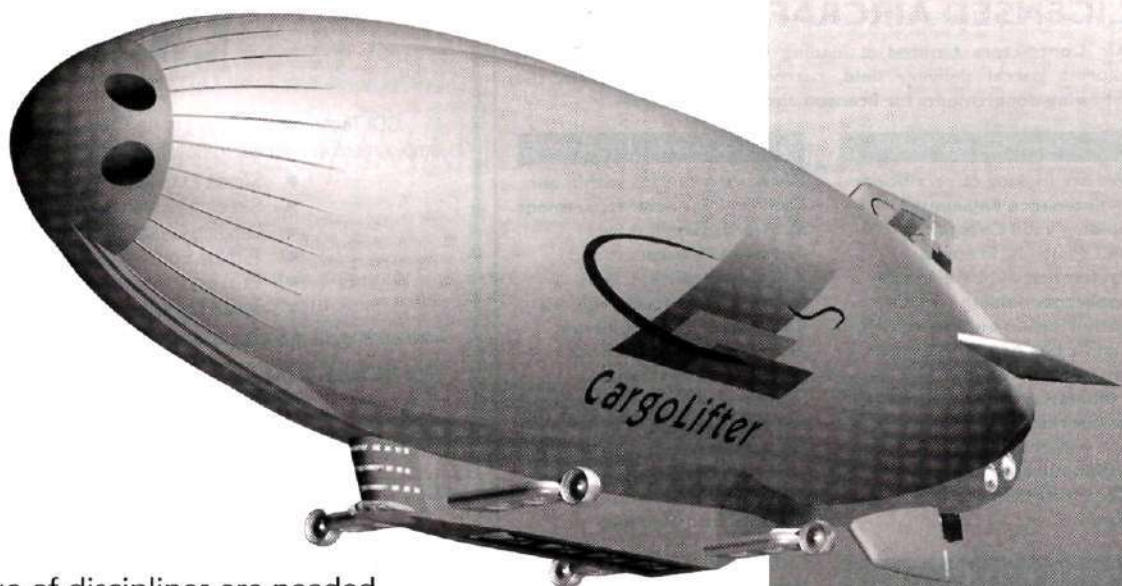
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Completed applications including photocopies of the Pilot Licence and the last current page of the log book must be returned by 5.00pm on Friday 30 June 2000.

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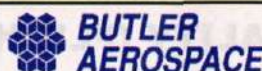
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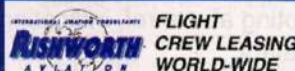
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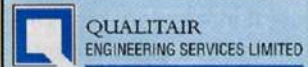
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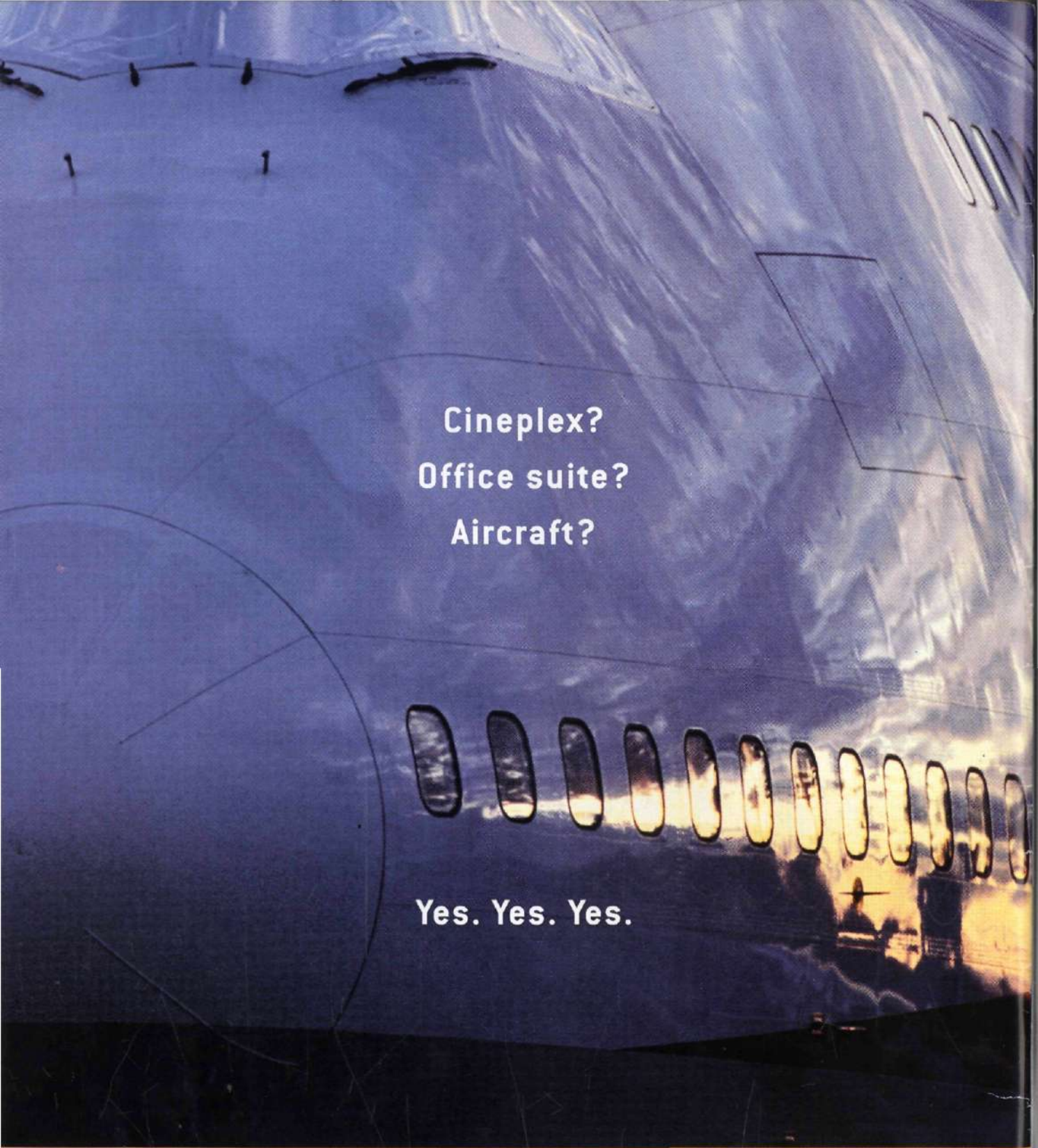
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