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In this issue

World News	110
Air Transport	114
ce Philip's Thoughts on Flying	122
Letters	125
"Air-Cushion Vehicles"	

	Special feature:	
	Furnishing and Finishing	127
	Sport and Business	132
	Industry International	133
	Spaceflight	134
	Defence	137
	Straight and Level	140

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Without the F-111

Something is not quite right with a system which cancels a British aircraft at a cost of about £200 million, vehemently defends a replacement order for the rival American project, then cancels that at a cost of perhaps £50 million. In fact, it all seems quite lunatic.

First Aeronautical Weekly in the World

The RAF will, as a result, be without long-range strike and reconnaissance ability from about 1975. While this considerably diminishes the power of the RAF, it does not mean the end of that Service, nor will it make it the mockery of the world, as some air marshals seem to be suggesting.

Only the air forces of the two super powers will have a wider range of capability. The RAF's super-élite aircraft has gone; but the Harrier, Jaguar, Phantom, VC10 and Nimrod will look up to no other aircraft in any air force. There is also the point, as the Duke of Edinburgh remarks in an interview in this issue, that a weapon is not very credible if it is so expensive that commanders do not use it in case they lose it. There were serious doubts about the credibility of only 50 F-111s on this score.

British air power will still be the most influential and effective in Western Europe. British naval power (nowadays so dependent on missiles and air technology) is by far the greatest in Europe and in the Mediterranean; and the British Army—though smaller than some others —is superior to any other in training and equipment (including its aircraft, missiles and radar supplied by the aircraft industry).

The air influence will be stronger and more enduring—industrially as well as politically and militarily—if Britain were to take the lead with a VG "mini F-111" combat aircraft: the FX, for want of a better name. Many countries, especially in Europe, will want to buy or build this type of aircraft from the mid-seventies. It should be a European project led by Britain, but it will never be this while Messrs Healey and Benn fiddle about with interminable project studies in the hope that these will attract European partners. The only thing that attracts partners is a firm project—as the French-led Jaguar attests. A mini-F-111 will be the standard European weapon of the seventies, eighties and nineties, and it will be as exportable as the Hunter and the Canberra were. Even the smallest pocket-handkerchief States will want swing-wing aircraft.

More of a loss to Britain than the F-111 will be the aircraft-carrier fleet. The original argument for scrapping it was that there had to be a financial choice between carriers and F-111/island bases. Now that the F-111 and the island-bases strategy are dead—and with them the policy of permanent British forces east of Suez—the already thin logic of the case against the carriers vanishes. Nothing will more efficiently meet the unpredictable future contingencies likely to arise in areas of British political interest. Mr Healey's decision to cancel carriers could come to be regretted as bitterly as has Mr Duncan Sandys's fateful "nomore-manned aircraft" decision of the decade before.

Regulation Without Efficiency

The Air Transport Licensing Board is now half-way through its marathon North Atlantic hearing. We are as convinced as ever that there is a more efficient way of regulating an air transport industry. Perhaps half the time spent by the applicants preparing their cases, and half the time spent arguing about them in the court room at Gaywood House, could be saved by routine publication of British airline traffic and cost data.

FLIGHT International, 25 January In



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THE DEFENCE SHRINKAGES

Cuts in Defence spending, amounting in the long term to over £300 million, were detailed by the Prime Minister in his statement to the House of Commons on Tuesday of last week, January 16, on public expenditure in 1968-69 and 1969-70.

Mr Wilson said that the Government's decisions had been based on two main principles: first, it was in Britain's own interests and those of her friends for the country to strengthen her economic base quickly, as there was no military strength, whether for Britain or for her allies, except on the basis of economic strength. Secondly, reductions in capability must be based on a review of the commitments the Services were required to undertake; defence must be related to foreign policy, but it must not be asked in the name of that policy to undertake commitments beyond its capability. With this preamble, the Prime Minister enumerated the defence decisions as follows:-

Withdrawal of forces from the Far East and from the Persian Gulf by the end of 1971, so that "apart from our



remaining dependencies and certain other necessary exceptions, we shall by that date not be maintaining military bases outside Europe and the Mediterranean." Again by 1971, forces will have been withdrawn from Malaysia and Singapore. Force declarations to SEATO will be amended as British forces in the area are run down.

An early reduction in the number of aircraft based in Cyprus is to be made, while maintaining British membership of CENTO.

These decisions, said Mr Wilson, will entail major changes in the role, size and shape of the forces, in the nature and scale of the equipment they will require and in the necessary supporting facilities. He gave the following illustrations of the effects of the decisions:—

Manpower saving will be greater than the total reduction of about 75,000 previously forecast for the mid-1970s, and it will be achieved earlier. Forecast reduction of 80,000 civilians is also aimed at earlier.

The Royal Navy's aircraft carrier

force is to be phased-out as soon as withdrawals from Malaysia, Singapore and the Gulf have been completed, and there are to be reductions in the rate of new Naval construction.

There is to be a considerable increase in the rate of rundown of the Army.

On the RAF, the Prime Minister said: "We have decided to cancel the order for 50 F-111 aircraft. Further study is being given to the consequences of this decision on the future equipment of the Royal Air Force. Leaving out of account the results of this study, the cancellation of the F-111 is estimated to yield total savings on the Defence Budget of about £400 million between now and 1977-78. This figure allows for likely cancellation charges. The saving in dollar expenditure over the period, again allowing for likely cancellation charges, will be well over \$700 million. Because of the credit arrangements, these savings will mature over a period of years. We are discussing with the United States Government future arrangements for offset orders and credit for the Phantom and Hercules aircraft. The reduction in our overseas commitments will make it possible to cut down the [RAF] transport force."

The Premier added that while the more rapid withdrawal of forces from outside Europe, and the changes it was intended to make in their role and equipment, would impose a massive task on those responsible for logistic support, very substantial savings in base facilities staff overseas would follow. "The future of the Services," he said, "will then lie mainly in Europe."

. . .

On the same day as Mr Wilson's statement to the Commons, the Minister of Defence, Mr Denis Healey, sent a



message to members of all three Services, in which he recapitulated the main points on the withdrawals, cancellations and reductions and added some others, for example this carefully phrased observation on possible overseas deployment of forces:—

"We shall retain no special military capability for possible deployment to the Far East once we have withdrawn, but forces drawn from our general capability based in the United Kingdo and in Europe will be available in deployment overseas. We shall thus in tain the ability to lend assistance our Commonwealth partners and o allies if circumstances were, in o judgment, to demand it."

On the reduction of the number aircraft based in Cyprus, Mr Hear said that this would occur as



Canberras there were replaced by bombers. He added that there was intention of giving up either of a Sovereign Base Areas on the island

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The full implications, for the Rd and the aircraft industry, of these of in defence expenditure are discussed the Defence pages (137-139) of the issue, and aspects of the Parliaments debate on the cuts are reported on pa-113. See also leading article (previous page).

Defence Cuts "Disastrous"

The Air League, which since the a cellation of TSR.2 has strongly support the acquisition of F-111s for the R and has opposed the phasing-out of a craft carriers, said in a statement is on the day of the Prime Minister's a nouncement in the House of Commutat it regarded the defence cuts as "t astrous." The League added: ---

"The withdrawal from east of s and the consequent lack of stability have a calamitous economic effect. At the F-111, this aircraft was required only for use in the Far East but i in Europe. What protection is now for our massive seaborne supplies, w which the very existence of this is depends?"

Exit from Fort Worth

As a result of the cancellation of British order for F-111s, a total of an 120 people from the United Kingdor engineers and their families—will leaving Fort Worth, site of the Gen Dynamics factory where the aircraft being manufactured. The engineers sent there, and are employed by, British Government; and the British P engineer, Mr A. T. Ching, was noted on Wednesday of last week as wing: "We don't know when we will we and I haven't received any word om London. It is obvious we won't be eded here now." A spokesman for General Dynamics id that cancellation of the British order ould not immediately affect production. The contract had been between the cor-oration and the US Government, which engineer, Mr A. T. Ching, was

ation and the US Government, which uld have sold the aircraft to the UK vernment.

ingapore after 1971 On his return from his eleventh-hour urney to London, where he had tried persuade the Government to retain ar East commitments, Singapore's me Minister, Mr Lee Kuan Yew, said at Britain would hand over as a gift island's defensive radar chain, British itructors would stay behind after the 71 withdrawal to train Singapore rces. Bloodhound or Rapier missiles and be installed for air defence. A ining squadron of Hunters would be uned by Britain until 1971 and pilot ining would begin immediately in th Britain and Singapore. Lightnings are being offered by Britain after 1971.

Crack in Concorde Collaboration

In saying, on January 19, that the first flight of the Concorde 001 prototype would take place sometime in the spring, M Jean Chamant, the French Transport Minister, was reported to have added: . . . there will be no fundamental change in the date of Concorde's first operational service. The date of February 28 was a working hypothesis rather than a definitive date. As a result of a British delay in the production of the final engines, the Concorde is at present receiving provisional engines which will be utilised only for ground tests. After these tests, final engines will be installed with a view to the first flight."

The French Transport Ministry later said: "These delays are attributable to a number of causes. They do not come only from the engines, and the responsibility cannot be attributed to one country rather than the other."

But the damage had been done. The British Press had been quick to pick up M Chamant's seemingly sniping remarks, and the Bristol Engines Division of Rolls-Royce replied that four engines were already at Toulouse and were undergoing final installation in 001. "We cannot understand the Minister's statement," added

Bristol, "which must be based on a misunderstanding." The four "flight" engines were under construction at Bristol and were due for delivery (on time) soon. The first of them would leave England at the end of this month. All the engines, it was said, would be delivered on schedule.

Although M Chamant did not mention the autopilot, Elliott-Automation cleared its own name by issuing a statement saying that the three essential subsystems of the automatic flight control system, and the autopilot system, had been delivered to Sud-Aviation at Toulouse.

The true cause of the delay seems to have been a combination of factors. The blame, if any, may lie with the Concorde Committee of Officials, who made a political decision to award the contract for the flying controls to Boulton Paul Aircraft Ltd at a time when it was felt by the British side that French companies were being awarded more than a fair share of Concorde equipment contracts and that the cost of the French flying controls (by Dassault) was too high. As a result of the change, testing of the system started late, but units have now been delivered and installed and

SENSOR

BAC are now seriously considering a "21-engined" One-Eleven variant, using the auxiliary power unit as a thrust booster. The Orpheus engine is a leading contender. The cost of developing a new Spey in the 15,000lb class is too high, and the " $2\frac{1}{2}$ " solution now appears to be the most promising and efficient. As already reported in this column, Boeing are considering a $2\frac{1}{2}$ -engined 737. The $2\frac{1}{2}$ -engined 500 will probably have a stretch of about six feet forward of the wing, permitting the addition of two more seat rows and making the aircraft into a 110-seater.

R&D cost of the RB.213 "Super Spey" project could be as much as £40 million and not less than £10 million, depending on which of various proposals is selected. The project will permit full exploitation of the Trident 3B and, in particular, of the One-Eleven.

The BAC One-Eleven order book takes production up to the summer of 1969, although three aircraft are available for delivery in 1968. The first production 500 is due to fly on February 5 or 6.

BAC expect to make a decision on their twin-Dart, 40-seat 201 project this year. The company is looking seriously also at what it calls a "leapfrog" airliner-an inter-city transport with perhaps as many as 100 seats and with STOL ability. Westland, too, are looking at this market very seriously, and have commissioned a market thigh from The Secondist latelligence study from The Economist Intelligence

Unit. The most advanced project studies, however, are probably those being done by Hawker Siddeley at Hatfield, where the emphasis is more on fanlift propulsion.

There is a growing feeling of resentment in the British aircraft industry, particularly at engineering levels, at the domineering attitude of some of their French partners. The French are very much assuming the leadership which, they believe, it is Britain's political will they should be given. This is making life difficult, and in some instances irritating, for British companies and engineers. Exceptions are Breguet, at all levels, and M Beteille, leader of the Sud A-300 programme.

There is no change in the plan to assemble the Jaguar at BAC Warton. Rumours that production, assembly and test-flying will all be centred at Breguet are not correct.

The UK VG project is now known in the Ministry of Technology as the Advanced Combat Aircraft or Future Combat Aircraft. Based on two Bristol Siddeley 143s (the RB.153 now having been ruled out) the estimated programme R&D cost is just under £150 million. This compares with £230 million targeted for the AFVG.

Although all companies participating in the A-300 Airbus are doing so as subcontractors to Sud (except for Rolls-Royce) a procedure is being devised whereby actual cash payment of the British subcontractors will be made by Mintech. This is intended to ensure that Mintech can check that the agreed $37\frac{1}{2}$ per cent of work is going to British companies. But direct financial control will be in Sud's hands, and this raises fundamental constitutional questions-which the Minister of Technology is glossing over-about his department's accountability to Parliament, through the Public Accounts Committee, for public spending which will be controlled by a foreign company.

A new jet transport requirement is opening up—for a 100-seater with a 5,000-ft take-off capability. This is one of two as yet unfulfilled jet airliner markets, the other being for the small jet feeder liner in the HS.136 category.

The RAF will take delivery of the last three of its order for VCI0s. The aircraft are so well advanced that cancellation penalties would almost be as high as contract cost.

The British Airports Authority's plans to take over Edinburgh Airport are well advanced. This will probably be accompanied by a take-over from the BoT of the Highlands and Islands aerodromes.

Although the United States Government is not taking any part in the Hanover Air Show, the Department of Commerce is already hard at work on plans for the 1969 Paris Air Show. Meetings are held at least weekly, and the first issue of the next Paris Air Show Newsletter is due to be circulated by the Department in February. The absence of a national pavilion or stand does not mean that the United States aerospace industry will not be extensively represented commercially at Hanover, either on company stands or on the stands of German subsidiaries or agents.



Hindsight The RAF acquired one new bomber last week, even if it did lose 50 F-111s. Flown into RAF Abingdon by Hercules was an ex-Royal Afghan Air Force Hawker Hind light bomber. Due for operational deployment in 1970 to the RAF Museum, the Hind has such radical features as a v-g defensive gunnery envelope, visual target acquisition and an adaptive cockpit environmental system

WORLD NEWS

there is no specific deficiency in performance.

M Chamant's comments, after analysis over the weekend, were being explained as "off-the-cuff" remarks at a cocktail party rather than as having any specific intention to cause trouble between the countries and firms involved.

Mr McNamara's Successor

Mr Clark Clifford, a partner in one of the biggest corporation law firms in Washington and for many years an official and unofficial adviser to American Presidents, was last week named by President Johnson as US Secretary of Defence in succession to Mr Robert McNamara. Mr Clifford is considered to be a determined protagonist of the Vietnam war.

Aircraft Industry Manpower Up

Total employment in the British aircraft industry reached its highest figure for two-and-a-half years in October 1967 --257,000, nearly 5,000 above the corresponding total for 1966.

These figures have been given this month by the Society of British Aerospace Companies, which recalls that the industry's highest previous manpower total, 258,500, was reached in April 1965, the month when TSR.2 was cancelled.

Shorts: US Interest ?

Two American companies, Fairchild-Hiller and Rohr Corporation, have been mentioned as reportedly interested in acquiring a shareholding in Short Brothers & Harland, Belfast, 69½ per cent of whose share capital is owned by the British Government and the remainder (15½ per cent each) by Rolls-Royce by its acquisition of Bristol Aeroplane (through BS Engines) and Harland & Wolff.

A spokesman for Fairchild-Hiller denied that his corporation was interested in buying a shareholding in Shorts, but it is believed that Rohr Corp, who manufacture aircraft and missile parts and assemblies, are interested, and would be prepared to proceed if the UK Government were willing to allow them to do so. They have an affinity in one aspect of manufacture—engine pods—with the Belfast company.

Shorts at present have a "caretaker" chairman, Mr D. L. Haviland (*Flight*, January 4), until a permanent successor to Mr C. E. Wrangham, who relinquished the chairmanship on December 31 last year, is appointed.

UK-USSR Technological Agreement

A technological agreement between the British and Soviet Governments was signed in London on January 19. Mr Anthony Wedgwood Benn, Minister of Technology, and Mr Fred Mulley, Minister of State at the Foreign Office, were the British signatories; and Academician V. A. Kirillin, Deputy Chairman of the Council of Ministers of the USSR and Chairman of the State Committee

112

FLIGHT International, 25 January

of the Council of Ministers of the USS for Science and Technology, signed is the Soviet Government.

This agreement, which was the mobilective of Mr Kirillin's five-day was to London (*Flight*, January 18), "puides a good basis for the furth development of scientific, technologic economic and trade links between a two countries," to quote a Minte announcement.

Coming into force from the date signature, the agreement provides, so the Ministry, "a basis for a wide ra of technological collaboration" betwee Britain and the USSR. Main method collaboration, in the initial stages, which is the be for working parties representing he sides to meet and to examine in dea the specific areas agreed. Surprising aviation technology is not directly spe fied in the agreement.

Helicopter Collaboration

"During the Anglo-French discuss an excellent working partnership been developed with Sud-Aviation at levels, which augurs well for the sum of the collaboration," say Westland A craft in their annual report, and p lished, for 1966-67, referring to the laborative helicopter programme on SA.330, WG.13 and SA.340.

In the financial year just ended, group has shown a consolidated m after taxation of £2,311,932, comp with £2,411,089 for 1965-66.

BALPA Clash with BUA

Because of the ban on British Un Airways' Africargo services into Joh nesburg, the weekly flights are termi ing in N'dola, Zambia, and the Bri Air Line Pilots' Association has object to the revised schedules which the line has set up. This involves cam spare crews who use rest facilities in Britannias, so that a week-long "slip Nairobi is replaced by two sep night-stops there on the out-and-re flights. The dispute has been take the Ministry of Labour, although the

Atlantic ferry memorial Recently erected at the airport at Gander, foundland, was this striking memorial. On it is a plaque with the work "ATLANTIC FERRY PILOT MEMORIAL. Air Vice-Marshal D. C. T. Bennett, C.B., C.B.E., D. was the Captain of a Lockheed Hudson Bomber which departed Gander 2233 GMT on the n November the Tenth, 1940, and landed at Aldergrove Ireland, 0945 GMT the next morning aircraft here is identical to the one that made this flight, which was the first successful Trans M crossing from Gander. It is mounted here on this site in commemoration of that event as many thousands of men and aircraft who have followed since then."



says that last Saturday's flight left time with the originally rostered crews ard.

ow BUA is negotiating a new "pay conditions" contract individually h its 327 pilots instead of through the ciation. A meeting of pilots at Gaton January 18 was told that fivecontracts would be offered. Salaries ild be frozen for two years (in mon with those of all the airline's ployees) and afterwards all pilots ald be placed on salary scales similar those of the VC10 pilots, irrespective the aircraft type flown. (The Britanare in any case being phased out.) s would give some pilots an increase, 1970, of more than £1,000 a year. managing director, Mr Alan Brisforecast at the meeting that BUA uld lose £1.1 million this year.

On the BALPA dispute, Mr Bristow d: "It had been demonstrated to me t BALPA, in recommending to their mbers not to accept the Africargo edule of January 1, are denying me freedom to manage BUA within sting legislation and agreements and so doing are frustrating not only my orts but the efforts of everybody else the company to return BUA to a profit-making position as soon as possible. BALPA's behaviour in this particular instance can only be described as contrary to the best interests of its members in BUA and renders agreements with the association meaningless."

At the weekend BALPA instructed its members in BUA—thought to amount to some 80 per cent of the company's pilots —not to sign the individual contracts. The association's executive council will discuss the matter shortly.

BAC Promotions

Mr Charles Gardner, OBE, ARAES, publicity manager of British Aircraft Corporation, and Mr N. W. Boorer, executive assistant to Sir George Edwards, the corporation's managing director, both on the staff of BAC (Operating) Ltd at Weybridge, have been promoted to the position and privileges equivalent to those of a divisional special director.

Mr Gardner joined Vickers-Armstrongs (Aircraft) in 1953 as assistant to the managing director, subsequently becoming manager, information, public relations and promotions; he was made BAC publicity manager on the formation of the corporation in 1960. Mr Boorer joined Vickers at Weybridge in 1931; before his present appointment he was chief project engineer at Weybridge, responsible to the chief engineer (Weybridge Division) for the administration and technical management of all new project work.

C. L. Startup

Flight regrets to record the death, after a long illness, of Mr Cuthbert L. Startup, well known in British civil aviation in the inter-wars years. Assistant for several years to Capt "Jerry" Shaw when the latter was aviation manager of Shell-Mex, he became a familiar figure at all the major flying contests held in this country in the twenties and early thirties. Later he entered the advertising side of aviation journalism and subsequently joined Desoutter Brothers Ltd.

His association with flying began in 1914 when he joined the Royal Naval Air Service and began his flying career on airships. Later he was transferred to aeroplanes and as a pilot flew landplanes, seaplanes and flying-boats. He was thus one of the few who had qualified on both lighter-than-air and heavier-than-air craft. Inevitably, perhaps, he earned the nickname "Contact" quite early in his career.

Parliament

is was the debate which, as they say, l everything—from Far East bases to nily allowances, from aircraft carriers school leavers, from F-111K cancellats to prescription charges. It was the at verbal writhing of Parliament under greatest-ever peacetime cuts in public benditure, a two-day battle of words ich ended last Thursday, January 18, h the Government gaining a majority 295 for its unpalatable decisions.

all began quietly enough, with the ncellor of the Exchequer moving that House approve the statement made the Prime Minister, then speaking for ost an hour (including interruptions) the economic situation and the ernment's decisions. His only referto defence almost echoed Mr Wils words. "Our part in world affairs," Mr Jenkins, "must be underpinned economic strength and not undered by economic weakness." Such a cess of disengagement from the role being a world power, he added, could er be carried out without some diffiand upheaval and recrimination. Chancellor then imparted the bleak rmation that "these defence cuts will yield any net saving in 1968-69. On contrary, there will be some cancellacharges to be met. The impossibility reducing expenditure on defence

before the year after next is one important reason why the level of public expenditure next year will still show an appreciable increase over this year."

Before passing from the subject of defence, Mr Jenkins gave an equivocal answer to a question from Mr Enoch Powell, the Opposition's chief spokesman on defence, who had asked the Chancellor to remind the House that defence was the sole major element of Government expenditure which had been steadily falling for many years past. To which Mr Jenkins replied that he did not know what was meant by "many years past"; certainly the programme the present Government took over, "so far from leading to a fall, would have led, had it been left unamended, to the most enormous increase in defence expenditure."

The Opposition's counter-attack was based on an amendment to the motion the Chancellor had proposed. Moved by Mr Iain Macleod, this amendment expressed no confidence in the Government and went on to deplore "cuts in defence which involve breaking faith with friends and allies and will severely undermine our national security."

Mr Macleod accused the Government of "plucking a sum out of the air" as a basis for their calculations. "I think that they have thought of a number, as they did for the National Plan," he said. "It was that which basically destroyed the National Plan. They did the same for their previous Defence Reviews, and that is one of the main reasons why the defence policy of this Government is a shambles today—because they have always tortured the facts to fit some unsupported figure."

On the specific issue of withdrawal from the Far East, Mr Macleod agreed that one day we would have to leave; it was folly to assume anything else. But the Conservatives believed that it was wrong to name a date, even a date in the mid-1970s, and then, having done so, to break our word: that was "shameful and criminal." He posed the question that, though the Vietnam war might be over by 1971, was it not dangerous to leave a vacuum on the southern flank and might it not encourage the continuance of a war which everyone wanted to see ended?

This was a debate which, over its two days, had most of the big guns firing from both sides of the House-Mr Jeremy Thorpe for the Liberals, who considered that the Prime Minister was "wildly off" in thinking that cancellation charges on the F-111K were likely to be only £40 million; Mr Duncan Sandys (who had a fierce exchange with the Minister of Defence), Mr Powell (who accused the Minister of "knocking the heart out of the Royal Air Force") and Mr Maudling for the Conservatives; Mr Stewart, the Prime Minister and the Foreign Secretary (who, as last speaker, said he would like to "restore the level of the debate") for the Government. On the Far East, Mr Brown averred that the contribution British forces were making to stability there was "becoming progressively less relevant"; and as to the Persian Gulf, the present situation was "as calm as it has been for many years."

When the Opposition's amendment was put it was defeated by 334 votes to 229, and the Prime Minister's statement was then approved by 304 votes to nine —the whole of the Conservative party and 25 Labour MPs abstaining, the latter thus giving the Government's Parliamentary victory a bitter taste indeed.



AIR TRANSPORT

Round One at the ATLB

N THE YEARS following 1963, BOAC contained its effort on the difficult routes such as the North Atlantic, Sir Giles Guthrie, the airline's chairman, told the Air Transport Licensing Board in London on January 16; the object was to accumulate reserves by building up aircraft utilisation and load factors. At the same time, such routes as the East coast of South America and the extension from New York to Washington, which "would never become profitable," were dropped. "I decided," said Sir Giles, "that BOAC must build up its financial reserves to at least £50 million, and that the way to do this was to ensure that we had one aircraft too few rather than one aircraft too many."

Sir Giles was leading BOAC's objections to applications from British Eagle International and Caledonian Airways to operate scheduled services on North Atlantic routes. Both the independent airlines had based their cases chiefly on BOAC's record on the routes, and on the alarming manner in which they considered the corporation to be losing out to Pan American, Trans World, and to some degree the fifth freedom carriers.

Sir Giles's statement fell on surprised ears, which had been expecting a more direct counter to the independents' position, accompanied by the usual objections—for example, that the licences, if granted, would result in material diversion of traffic away from BOAC. There were those present who were clearly astounded by what they considered to be a frank admission that BOAC had been content to lose to the US carriers a slice of the increasing traffic and that it had done so in the interests of playing safe and ensuring a surplus.

"What has the result of this policy been?" asked Sir Giles. "By rigorous planning and disciplines we have pushed our aircraft utilisation up to a year-round average of 10¼hr per aircraft per day for the fleet as a whole. . . . Our Boeing 707 fleet of 19 aircraft attained a peak summer utilisation in 1967 of over 12½hr per day. We have made operating surpluses of £16.8 million in 1964-65, £20.7 million in 1965-66, £23.3 million in 1966-67, and have already tucked away £11.7 million for the first half of the present year. The amount of capacity allocated to the London-New York route and indeed to the other routes in this hearing is therefore a matter of deliberate policy and not of inadequate planning or faulty estimation of traffic growth."

Sir Giles was not only unrepentant in the face of the independents' accusations that BOAC's high load factors, running as much as 10 per cent above the IATA average, were in fact driving away the traffic to foreign carriers. By treating the ATLB's decision as a foregone conclusion, he also gave the strong impression that he was very little concerned with the present proceedings, but was by implication addressing himself to the Board of Trade appeals commissioned to whom the case is more or less bound to find its wa eventually. He concerned himself closely with Governme policy, but said that the relationship between the prese applications and that policy could be expressed quite shorth they were in total opposition. The Government's policy was n the only one; the ATLB itself had a policy, and this w diametrically opposed to that of the Government, The ATI had made it plain that they would license a second operation on an existing route under certain conditions, and on London New York it was relatively easy for the applicants to m these conditions. "The applicants might therefore reasonable expect to be home and dry-or almost so. Their application would appear to be prima facie acceptable, and unless the is something wrong with them as airlines or there are so adverse 'practical circumstances of the route' . . . they mu expect to get their licences. Why, then, do they bother present us with all these traffic statistics, and why in particul do they find it necessary to denigrate BOAC's performance The question of BOAC's performance on a route was of relevant in marginal route cases where traffic might not ha been built up; this had apparently been the case in 1961 wh British Eagle had been refused its application to set Canadian points. The airline had been told in effect to go aw and wait until BOAC had built up the route. This BOAC h done to such effect that the Board's criteria were now met.

It was this conflict between the policy of the Governme and that of the ATLB, said Sir Giles, that was the main ism The question of whether the frequencies offered by BOA were sufficient or not was of no significance at all. "If extra daily frequency is required, we have the capacity mount it ourselves." BOAC could have chased the peak of North Atlantic traffic a little harder, admitted Sir Giles; " could have carried a few more passengers—and we could he lost a lot of money in the process."

Sir Giles concluded by expressing serious doubts as whether the applicants were really capable of mounting thes of operation for which they were applying. "Looking at the proposals with the cold eye of a merchant banker, and know as I do, rather more about the finances of some of t independents than is public property, I must say that I for would not be very happy at the prospect of putting my mon into their business." He doubted whether either of them we ever likely to be in the "big league," and said that althout they talked big, they were "very, very small fry."

The cases of the two applicants (summarised in Flight



British Eagle's first e Qantas Boeing 707-13 at Sydney's Kingsfi Smith Airport just befi its initial test flight at end of last month. The without registration me —VH-EBD (its Qant registration) was used the call sign on the a flight—it has since beco G-AVZZ

TISH EAGLE: Projected Direct Operating Costs, UK-New York

			London	New York	London	Total
ck time for fuel l uplift n-off anks l price, pe	 nce/im;	 gal	7.52hr 15,344gal 15,344gal 13,121gal 2,223gal 9.46	6.23hr 12,909gal 10,686gal 10,859gal 2,050gal 13.50	(2,050gal) 9.46	13.75hr 28,253gal 23,980gal 23,980gal 4,273gal
cost ding fees toms ding hsport ering			£ 605 11 30 200	£ 601 45 65 540 350	(81) 271 	£ 1,125 11 316 65 540 60 550
Total			846	1,601	220	2,667

rect maintenance at £67.0 per hour x 13.75 hours Direct maintenance slip crews): Total cost (excluding slip crews):

ITISH EAGLE: Financial Forecast, UK-New York, first and fifth years peration

£3.589

	4						lst year	5th year
of flights							392 5 390	546 7 507
irs flown							3,370	1,507
ts, £ x1,0	00:				10/	.	1.404.0	2 154 5
ct operat	ting C	osts (II	reasin	ng by 2	170 P.1	L.)	1,400.8	2,134.3
d operati	ing co	sts	***	***	***	***	1,108.7	1,991.0
crews		***	***	***	***		31.0	1000 7
able dire	ct cos	\$5	***	***	***	***	202.0	201.2
rertising		***	***	***	***	***	372.0	301.3
erhead	***		4.6.5			***	307.0	221.1
Total co	sc						3,887.5	5,273.6
arity seat	units						125,440	174,720
at cost un	its				-		63.723	108,414
id factor	***				***	"	51	62
venue, £ x	1,000	0		1000				
sengers		***	***		***		3,915.5	6,027.1
ight	***		***	***	***	***	156.8	436.8
Total							4,072,3	6,463.9
plus (sho	efall).	fxl	.000:		-		U.S. S. S. S. S. S.	1
annum							184.8	1,190.3
mulative							(220.9)	3,498.6
				-	-			

tek, page 77) were broadly similar in approach, and asserted at future traffic growth on the North Atlantic justified the ignation of a second British carrier to secure for this country rightful share of the traffic. Both carriers were also objecting each other's applications in respect of New York services. d it was clear that Caledonian in particular was none too ppy with some of the figures which were contained in itish Eagle's exhibit. Mr L. N. Bebchick, for Caledonian, deavoured to cast doubt in particular on the wisdom of itish Eagle's application for a 14-weekly peak frequency m the outset of operations, and pointed out that in no tance had any carrier in recent years instituted Atlantic vices at such a high frequency. Caledonian, he said, would

ONDON AIRPORTS' FUTURE

a slide-illustrated lecture to the London Airport branch of Royal Aeronautical Society on January 18, Mr Peter sefield, chairman of the British Airports Authority, revealed ral new features of the Authority's forward planning which affect both Heathrow and Stansted. Backed by a forecast doubling of current annual air transport movements into three London airports by the late '70s (400,000 in 1967 800,000 then) and a probable increase in the average number passengers carried per aircraft, Mr Masefield explained need for an increase in the present standard busy rate BR) of 64 movements per hour. This would have to be creased to 72 and possibly to 80. At the intermediate figure athrow would be operating to capacity, in the peak summer tiod, by 1971-72 and, at an SBR of 80, the limit would be iched in 1974. This, he said, was the basic reason for needing a third

CALEDONIAN AIRWAYS: Representative Direct Operating Costs, London-New York, 1970 Block hours: 14.33

			1211			£ per return flight	£ per hour
Fuel Oil				 		1,265.376 38.691	88.303 2.700
Airport	author agents	charge	rges es	 ••••	•••	525.812 754.583	36.693 52.657
Mainter	ance er liabil	ity ins		 		1,433.000	100.000
To	tal		····	 		4.888.782	341.157

CALEDONIAN AIRWAYS: Projected Financial Results

	Year ending Sept 30, 1969	Year ending Sept 30, 1973			
and the second second	London- New York	London- New York	All N. Atlantic routes		
Hours flown	2,307	5,718	14,506		
Forecast revenue	£1,576,511	£4,294,998	£10,237,602		
Direct operating costs Fixed operating costs Contribution Variable direct costs	£786,687 502,926 286,898 460,000	£1,989,864 960,624 1,344,510 620,490	£5,125,917 2,437,008 2,674,677 1,443,000		
Operating profit (loss)	£(173,102)	£724,020	£1,231,677		
Passengers carried	22,247	61,345	145,942		

begin with one a day, and it would serve points other than London and New York. His clients already had the personnel and aircraft required for the services (a fourth jet would be added to the fleet in 1971), and had superiority in experience, equipment, finance and promotion.

Mr P. Webster, oc, for British Eagle, said that the Board had been right to grant his clients' North Atlantic application in 1961 (later reversed on appeal), and that they were even more entitled to have their application granted at the present time. He pointed in particular to the size of British Eagle and to its resources (it had a comprehensive maintenance facility) and experience. It emerged from Mr Webster's introduction of the British Eagle case that the airline is not now planning the use of VC10s on the routes applied for, at least for the time being, and that it will use Boeing 707-320Cs.

In his cross-examination of British Eagle witnesses, Mr R. M. Forrest, for BOAC, sought to show that, while it had been claimed that the corporation had been losing traffic to the US carriers, in fact it was the charter carriers who were losing the most. It would be more appropriate, he said, if the independents were to apply themselves to safeguarding this market before trying to enter the scheduled market. To develop this point, he asked the Board if they would release statistics in their possession giving the charter traffic broken down by individual airlines. To this, the applicants objected that the matter was irrelevant to BOAC's objections, and that if any figures were to be released, then a complete set should be given. The Board declined in the end to release any at all.

airport, for Paris Nord would be ready by 1972, and if London does not have a third airport shortly afterwards it will lose traffic to Paris because Heathrow and Gatwick will become saturated at peak periods. One of the measures which will help to increase Heathrow's SBR will be the lengthening, this year, of runway 28R to 12,000ft-giving a 20 per cent increase in SBR because the long-haul traffic will be able to use it, turning north away from the short-haul traffic using 28L instead of the two streams conflicting, which can happen at present.

On Stansted, Mr Masefield said that two runways would give 120 movements/hour, while four would provide 180. Asked about the crosswind landing situation under the plan to re-align Stansted's runways (see page 117), he said that aircraft ought to be able to cope with a 30kt crosswind component in future, and that wider runways would be a help. He would also like to see the spacing between runways increased to the order of 9,000ft.

AIR TRANSPORT

SAAB AIRLINER PROJECTS

IT has been known since last summer (Flight for July 27, page 126) that Saab has been considering re-entering the commercial aircraft manufacturing business, and has been conducting design studies into two possible short-haul aircraft. More details of these projects have now been published by Interavia. The Saab 1071 is a 40-seat STOL short-hauler powered by four turboprops in the 800 h.p. class. With a gross weight of around 28,000lb, it promises to carry a 10,000lb payload over short stages and have an ultimate range of 1,240 miles with a reduced payload. The cruising speed would be 250 m.p.h., and the required field length about 2,600ft. Saab estimates the development cost would be £8 million and that the unit cost would be up to £400,000 per aircraft. The 1071 is of a size that is neglected by builders, but is perhaps of growing concern to operators of the developing third-level services in America and elsewhere, using, at present, aircraft of up to 20 seats. The 53-seat DHC Buffalo Commuter is perhaps the nearest projected competitor.

The second Saab project study is for an 80-seat short-hauler powered by two turbofans in the 10,000lb-thrust class (Rolls-Royce Trent), and known as the 1073. This is a far more heavily subscribed category of aircraft than that at which the 1071 is aimed, but the claim to lift 80 passengers on two Trent-sized engines is more than that of such rivals as the Fokker Fellowship and Fairchild Hiller FH-228. The 1073 is proposed with a high-placed swept wing carrying podded engines. A swing-aside nose and a raised flight deck are other features of the design. It is expected to carry up to 16,000lb payload over short stages and have a maximum range of 1,600 miles. With a field length requirement of 4,000ft, the cruising speed would be 435 to 500 m.p.h. Development is expected to cost £25 million and the unit cost to be £1.2 million per aircraft. Market research now in hand is expected to lead to a go-ahead, or not, decision some time this year.

Not Aer Lingus In the table of non-scheduled fatal accidents in 1967 (*Flight* for January 11, page 46) the accident on June 12 to a Bristol 170 at Dublin Airport was attributed to Aer Lingus. The operator's name should have been Aer Turas.

Olympic Buys 727s Four of the long-bodied Boeing 727-200s have been ordered by Olympic Airways for service in Europe in 1969. The Greek airline has also ordered two more 707-320Cs for delivery in 1969—making six in all, with three so far delivered.

Another Carvair for Ansett A third Carvair is to be delivered to Ansett-ANA, the Australian domestic carrier, in June/July for all-freight operations on the trunk routes. The DC-4, to be converted by Aviation Traders, will be VH-INM and it is being ferried to England this month. Ansett's first Carvair entered service in October 1965.



One of Saab's project studies for a possible re-entry by the componint the commercial aircraft manufacturing business, is this 40-sea STOL turboprop, the 1071. Fuller details of this, and a twin-turbofu short-hauler also being studied, appear on this page

Saudi Arabian's -320Cs The first Boeing 707-320C for Sau Arabian Airlines (-368C is the carrier's designation) we delivered on January 10 and the second was due to be rolle out on January 22. They will go into service in April wit 24 first-class and 117 economy-class seats—except during the Haj Festival, when they will be operated with 195 econom seats for Moslem pilgrimage flights to Jeddah.

First -63 for CPAL On January 17 Canadian Pacific too delivery of their first DC-8-63—and the first of the type to h delivered in the Western Hemisphere. Laid out for 19 passengers and called the Spacemaster by the airline, it wi enter service on January 31 on the Vancouver-Tokyo-Hon Kong route. CPAL have another three -63s on order.

Another Garrett-Skyvan Order Northern Consolidated Ai lines has ordered two Garrett-engined Short Skyvans for the operations in south-west Alaska. The first will be one of the initial production aircraft due off the Belfast lines in May an the second will be delivered in August. Northern Consolidate already have an Astazou-powered Skyvan in service; this we delivered last April.

Taking Over From Aden? As the only air carrier to registered in Aden, Brothers Air Services Co (BASCO)—one whose DC-3s was pictured in the issue of December page 938—are planning to develop the services previous operated by Aden Airways. They have applied to the Brit Government for traffic rights to Bahrain and London and ho to start services early this year using DC-6s, one of which h been leased initially from Transavia Holland. BASCO, wi have a fleet of six DC-3s, say that, if the network develops planned, jet aircraft will be required by the end of this year

Pacific Western's Lockheed L-382B (CF-PWO) at Prestwick earlier this month en route from Benina Airport, Benghazi. The next stop was Sondre Stromfjord, Greenland



All Change at Stansted

Runway re-alignment to reduce noise problems

ATEST STAGE IN THE STANSTED SAGA is for the Ministry of Housing and Local Government to write to local authorities in the area asking for their comments on a Board of rade proposal to re-align the runway layout at Stansted. the original proposals the present long runway (05/23) ould have been retained and extended from 10,000ft to 500ft and further runways would have been built parallel it.

As was shown on the maps published on page 76 of last eek's issue, the noise and number index contour of 40 NNI ee footnote to the table) would have subjected a considerable mber of people in Bishop's Stortford, Sawbridgeworth, arlow and Haverhill to noise nuisance. The new proposals ovide two parallel runways 12,500ft long on an axis of 2/20-or almost north-south. The new runways will be located the east of the present runway and the first is expected to be crational in about 1974.

The change will reduce the number of people affected by ise by two-thirds (see below). The figures in the table are sed on present populations in the area, and, said the BoT, ne would hope that development would be sensibly planned ad that the figures would not go up by the 1980s." The NNI iues are based on both runways being used at a rate of 64 ovements per hour—a stage which will not be reached until the mid-1980s.

The extra capital cost of building the two runways will be the region of £8 million, compared with the estimated total st of developing Stansted by 1974, which is around £45 llion, plus an estimated annual capital expenditure in the gion of £8 million for several years after that. The extra land quired for the proposed scheme would amount to some 700 res above the 2,800 extra acres which is needed for Stansted welopment anyway.

Per	sons	Dwellings		
Original Plan	New Plan	Original Plan	New Plan	
500	700	170	240	
3,900 24,200	2,600 7,200	1,300 7,700	880 2,400	
28,600	10,500	9,170	3,520	
26,100	8,800	7,900	2,900	
54,700	19,300	17,070	6,420	
	Per Original Plan 500 3,900 24,200 28,600 26,100 54,700	Persons Original Plan New Plan 500 700 3,900 2,600 24,200 7,200 28,600 10,500 26,100 8,800 54,700 19,300	Persons Dwell Original Plan New Plan Original Plan 500 700 I70 3,900 2,600 1,300 24,200 7,200 7,700 28,600 10,500 9,170 26,100 8,800 7,900 54,700 19,300 17,070	

STANSTED AIRPORT: NOISE CONTOURS

NNI = Noise and Number Index, which takes into account the fact that moyance is caused not only by the PNdb levels experienced, but also by the umber of aircraft heard. An NNI of 45, for example, would result from 100 iscraft of noisiness 95 PNdb, or 82 aircraft of 100 PNdb, or 52 aircraft of 05 PNdb.

Comments on the scheme from local authorities are not pected to include the basic question of Stansted development. In the assumption that development goes on," said the BoT, hey may have suggestions for improving the proposed neme. It is intended to hold honest consultations on the tits of this particular plan." The spokesman added that he Government is convinced, on cost grounds alone, that ansted is so far ahead of the alternatives that the £8 million that for re-aligning the runways is worth it. The Government monolithic on this question, and it is still collective Governent policy to go ahead with Stansted."

On the operational side it was explained that the existing nway would continue to be used until the noise levels

generated become intolerable, when its use will be discontinued. At that time in any case it is expected that the first new runway will have been built. The two parallel runways are expected to carry all the traffic generated until the 1980s, and apparently no firm decision has been made to build a further two parallel pairs. Further development will take place as required, and it is understood that the BoT feels that there may be a demand in the next decade, not for a fourth London airport, but for a new provincial international airport which might make four runways at Stansted unnecessary. If four runways are built, they would be sited on the outside of, but adjacent to, the two new runways. A new planning application (probably with a public inquiry) would have to be set up before four runways could be built.

Crosswind Problem

The Board of Trade maintains that the re-alignment of Stansted's runway will not reduce their operational effectiveness, but it seems that there are several pilots willing to question that assertion on the grounds that crosswind components on a north-south runway will be more than 20kt on sufficient occasions to make the airport unpopular if not unviable. The BoT asks and answers the question in this way:

"Does re-alignment entail a lower crosswind usability for the airport? The answer is that it does, but only to an insignificant extent. The Meteorological Office have supplied figures showing that, if crosswind components of up to 20kt are acceptable (this is the usual criterion on which major airports are now planned), the crosswind usability of both alignments is exactly the same, at 99.7 per cent. If a lower crosswind acceptability limit is taken, the new alignment comes out slightly worse than the original one, but only to the extent of a few decimal points of the percentage of annual occasions."

On the question of runway separation the BAA now believes that the minimum separation between parallel runways must be 7,500ft, rather than the 6,000ft envisaged at the time of the Stansted public inquiry, because of the prospect of the Boeing 747 (and even larger successors) now being clearer. Proper allowance, it is felt, must be made for the increases in length and span of aircraft. For comparison, the BoT quoted the separation between the centrelines of the inner parallel runways at Paris Nord, which is approximately 10,000ft.

It was announced last week that the British Airports Authority is to spend some £20,000 on extending and improving the passenger terminal and car-parking facilities at Stansted in order to deal with the inclusive-tours flight programme by Channel Airways this summer. Work on these improvements is to start immediately so that the new facilities will be ready for April 1.

Planning permission, recently granted by the Essex County Council, allows the Authority to develop a further extension to the present terminal so that simultaneous processing of arriving and departing passengers can take place. It will mean that the total area of the building will be increased from 13,500 sq ft to just over 20,000 sq ft, making way for a new passenger lounge, Customs area and refreshment counter. Channel Airways, who are to operate Tridents and BAC One-Elevens from Stansted, have also received planning permission from the County Council for the erection of a two-storey admin/ops building, which will house offices, crew rest rooms and a canteen.

These improvements are designed to handle an expected 120,000 passenger flow from April through to September. By 1969, however, it is hoped that work will have been completed on a new interim terminal building.

AIR TRANSPORT

Memo for the Edwards Committee

A NINCREASE IN THE POWERS of the Air Transport Licensing Board, a revision of the appeals system, greater emphasis on the needs of the public and a reduction and simplification of cargo rates—these are among many recommendations made by the Association of British Chambers of Commerce in a memorandum to the Edwards Committee of Inquiry into Civil Air Transport. In particular, the ABCC strongly disagrees with the views expressed recently by the Select Committee on Nationalised Industries to the effect that the ATLB should be abolished and their functions transferred to the Board of Trade (see *Flight* for November 16, pages 794-795).

On the contrary-while agreeing with the Select Committee that much of the uncertainty over long-term policy stems from an unsatisfactory relationship between the ATLB and the BoT-the ABCC recommends that the powers of the ATLB should be increased and that appeals from their decisions should be permitted only on points of law and settled by a judicial court rather than by the Minister (now the President of the Board of Trade). The memorandum says: "We are convinced that the only way to achieve long-run stability is to take the system out of politics, not to embed it even more firmly in politics. In our view it is the Minister, with his divided responsibilities, who has imported uncertainty into the situation. . . . It is obviously for the Minister to draw up, and for Parliament to approve, the rules which the ATLB must apply, but we see no reason why, freed from periodic overturning of their decisions, the ATLB should not develop the same kind of authority as the Civil Aeronautics Board in the USA."

The terms of reference of the ATLB should, the memorandum says, be amended so that their principal duty should be defined as being to foster the development of civil aviation in the public interest. Licences should be granted to airlines for periods of not less than ten years and new licences should not be limited in frequency but should have written into them a minimum frequency which the operator would be obliged to provide on a "use it or lose it" basis.

So as to encourage the development of air cargo, the ABCC recommend that British airlines should be urged to examine and promote, within IATA, ways of reducing freight rates and of simplifying the whole rate structure. Realistic amendments to the structure, based on savings obtainable from unitisation, would contribute to both objectives simultaneously. The possibilities of introducing a system of deferred freight rates on the long-haul routes should be examined. Airlines should be free to quote competitive rates to users offering consign ments of a minimum of 1,000kg. The development of air freight services to and from provincial airports, including the development of all-cargo services, should be encouraged for it own sake and as a way of reducing congestion around London

The ABCC believe that a strengthened ATLB, operatin under new terms of reference, would hasten the developmen of international services to and from provincial airports. new civil aviation bill, if enacted, should be used to provid financial incentives to stimulate such provincial services. The Association also recommend that airport policy should recent closer attention at regional and national level than it has received in the past, when sporadic and haphazard growth has been the order of the day. Regional economic plannin councils should be fully consulted with a view to producin at least an outline of what is likely to constitute a reasonable network of airports throughout the country.

With the development of the SST and of very big-capacity jet aircraft, the ABCC favour the reintroduction of a multiple fare structure so that the passenger will be able to choos between speed and prestige on the one hand and econom on the other. All formalities such as Customs and immigration clearance should be seen as part of the transport process an not as entirely separate functions. These and other ancillar operations, such as the handling of baggage, require careful planning if the time taken on the ground section of a journe is not to assume a quite unacceptable proportion of the tot travelling time.

Finally, the Association recommend the creation of statutory air transport users' council to perform, for the U as a whole, a function similar to, but wider than, that present performed by the various regional advisory committee

The ABCC's views are of importance not only because very large number of the 65,000 companies represented in the membership are users of air transport, but also because the Association has taken a keen interest in air transport for the past ten years or so. Since 1958, when a working party was up to study the air transport industry, the Association has, it instance, criticised the appeal procedure in 1962 and, in 196 approached the then Minister of Aviation to point to the had of a clear-cut policy for the industry. This latest 5,000-plu word memorandum demonstrates a vigorous and adult under standing of the problems involved.

One of Transair Sweden's two Boeing 727-100s (SE-DDA) which carry the pleasant promotional name of "Sunjet." The airline has a third 12 a -100C cargo variant, on order

transair sweden u-ou



Above, the Rolls-Royce Bristol M45H turbofan engine for the VFW-614 is being built in collaboration with Snecma. The first engine will run this autumn. Right, a model of the VFW-614—the world's smallest jet airliner

VFW-614 PROGRESS

FIER five years of project definition studies, market research ad protracted negotiations on international industrial collaboraon, most of the uncertainty has gone from the VFW-614 feedernute turbofan airliner project. The emergent German industry hould now realise its longed-for return to airliner manufacuring. Work is in hand on five prototypes, the first to fly in tay 1970, and in the middle of next year Vereinigte Flugchaische Werke (VFW) and its cost-sharing partners, moughout Europe, will decide one way or another on a roduction programme. Flight development and certification esting is expected to take 16 months, so the type could enter rine service early in 1972. VFW has conducted world-wide tarket research and made detailed route studies and presentaons to 35 airlines, and believes in a potential demand for over 00 VFW-614s by 1980.

Confidence in the project is now fully shared by the manufacring partners in five countries, and by the governments of ermany, the Netherlands, Britain and France who have lent nancial support in various ways. The aircraft will be assembled one of the VFW factories located in the Bremen area, and the mpany will build the wing and fuselage centre section and e nose, and Siebel the rear fuselage. In the Netherlands, okker will build the outer wings and the engine pylons, with e Belgian company Sabca making the flaps and ailerons. In fitain, the Rolls-Royce central management has endorsed the triler decision of Bristol Siddeley (now the Bristol Division R-R) to collaborate with Snecma on building the M45H rbofan with this as the prime application. Shorts will build e engine nacelles and Dowty the undercarriage.

arket Considerations The VFW-614 is the first attempt that most technically difficult of all categories of commercial traft, the jet feederliner. One remembers the well-subscribed AA-backed competition to encourage the design of a local



Left, block-speed comparison of the VFW-614 with other short-haul jets. Right, payload-carrying abilities of various shorthaul jets operating out of a 3,500ft-long field under ISA, s.l. conditions

ECONOMIC COMPARISON ON A 100-MILE SECTOR

1

	VFW-614	FH-228	F.28	DC-9-10	HS.748
Price (\$ million)	1.9	2.7	2.9	3.7	1.25
Seats (34in pitch)	40	50	60	80	44
Baggage vol per passenger (cu ft) Gross wt(lb) FAR take-off dist (ft) Block time (min)	5.5 37,000 3,550 27	9.5 54,500 3,790 24	7.6 56,700 4,030 24	8.1 91,500 7,750 24	6.0 44,500 3,260 36
aircraft-mile (\$)	1.15	1.38	1.44	1.71	1.12
DOC per seat-mile (cents)	2.9	2.8	2.4	2.2	2.5

service airliner—the conclusion was that it was impossible to build an economically attractive aircraft of around 30-seat capacity for ultra-short-haul operation. Hawker Siddeley and others have long studied the requirement, but none have yet seen a way to beat the economic performance of such turboprops as the HS.748, and the Fokker Fellowship. However, as all sectors of air transport grow, and world trade continues to develop, feeder-route services will grow in density and in number, and there will be more competition among airlines, and with surface transport. These are the reasons behind VFW's conviction that the jet revolution is at hand on even the shortest of routes.

It is estimated that the VFW-614 will cost a few per cent more than will the HS.748 under all of the very diverse operating conditions in which that turboprop and its kind, now the very bottom end of the airliner size scale. The VFW-614 would be some 8min faster than a turboprop on a 100-mile sector and only two or three minutes slower than larger feederline jets such as the Fellowship and DC-9. Being at the very bottom end of the airliner size scale, the VFW-614 mixes well with the larger short-haulers to give a very good



AIR TRANSPORT ...

combined return on investment in the case of an airline having a mixture of low- and high-density traffic routes.

From VFW studies of the total market and the feeder routes in particular, it is estimated that on average something like 26 per cent of the potential demand would opt for a jet such as the -614. The portion is over 28 per cent in the USA, though only 21 per cent in Africa and other underdeveloped areas. Of the total potential for the VFW-614 of 320 aircraft by 1980, the distribution is estimated as: 55, North America; 79, Latin America; 102, Australia and the Far East; 47, Europe; and 27, Africa and Middle East.

VFW-614 Design has not changed very much during the last year or so. The early idea of a swing-aside nose for freight and vehicle loading was abandoned after consulting with the airlines, and a Friendship-sized freight door on the starboard side has been incorporated instead. Most of the overall layout and system philosophies are now frozen and detail design is progressing. The engine support pylons have undergone careful study in the wind tunnel and special contouring has eliminated an aircraft pitch down at high Mach number (the critical Mach is now just under 0.7). The wing trailing edge flaps are now of single-slotted Fowler type and this has saved some 2001b compared with the earlier triple-slotted design (take-off and landing distances at the 37,0001b gross weight are almost identical). The flight deck layout has also undergone some degree of change.

M45H Progress Engine characteristics play a very large part in determining the overall performance of a small short-hauler. A Rolls-Royce Bristol Division go-ahead on the M45H in collaboration with Snecma was made last June. The two-spool, 3:1 by-pass turbofan is being designed for an initial take-off thrust rating of 8,060lb under ISA, s.l. conditions (VFW is asking for only 7,700lb, and the 360lb extra is an insurance against a later call for more thrust). There have been some technical changes in the engine since the project came under R-R, and typical of these is the step up to a 20,000hr minimum life for major components, and detail improvements in the light of the experience of long-term disc-spinning tests. The first testbed run of an M45H is scheduled for October this year.

AUSTRALIA'S INADEQUATE RUNWAYS

THE cost of taking Australia into the jumbo jet age will need to include about \$A45 million (£20 million) for runway extensions at Sydney, Tullamarine (Melbourne) and Brisbane. The Australian Federation of Air Pilots has said that, because of the noise-abatement procedures, the Sydney runway might need to be 14,000ft instead of the maximum of 12,500ft now planned. The federation also said it had told the Australian Government, when the Sydney runway was being extended to 8,500ft into Botany Bay, that this would not be enough. The New South Wales Advisory Minister of Transport has also said that the airport development committee had maintained 2½ years ago that the 8,500ft runway was inadequate.

TOUR PRICES UNCHANGED

THE Board of Trade has decided, after consultation with operators and travel-trade representatives, that minimum inclusive-tour prices for charters will be allowed to remain at their pre-devaluation levels for destinations in Europe and North Africa during the summer of 1968 (April 1-October 3). Alternative tariffs to this effect have been approved by the BoT. Tour prices on scheduled services by IATA members will be bound by the relevant resolutions of the association. Last month Mr Anthony Crosland, President of the BoT, said that he proposed to make a "thorough review of the basis on which the prices of charter inclusive tours are determined." At present, with some variations approved by the ATLB and the BoT, they are governed by Provision 1—which rules that a holiday package must not be offered for less than the minimum scheduled fare for the time and date.

Transglobe's CL-44s Atlantic Aviation of Canada has been awarded a \$400,000 (£155,000) contract by Seaboard World for the modification and re-certification of their Canadar CL-44s prior to delivery to Transglobe Airways of Gatwick

Stockport Accident Inquiry The public inquiry into the accident to the Canadair C-4 at Stockport on June 4, 1967, which was adjourned on December 13, will be resumed at 10 a.m. on March 25 at 6 Burlington Gardens, London WI

First Fatal On January 15 a United Arab Airlines DC3 crashed in the Nile Delta, killing the four-man crew, the only occupants. The aircraft was carrying newspapers from Cairo to Beirut, Lebanon. This was the first fatal accident recorded in 1968.

PIA Atlantic Deferment The restarting of Pakistan International Airlines' North Atlantic operations has been deferred because of the likely adverse effect on traffic of the US trave restrictions and the British devaluation of sterling. Las October the airline announced the intention of restarting services to New York in April this year after a lapse of monthan four years.

Northeast Off Subsidy For the first time since 1963 North east Airlines is now operating without a Federal subsidy which ended on December 31, 1967, with a two-year main payment of \$5 million (£2 million). The CAB considers that the competitive outlook for the airline is now favourable is the New York-Florida and commuter markets.

Aloha Buys 737s As forecast by Sensor in *Flight* in December 14, Aloha Airlines of Hawaii have announced a order for two Boeing 737-200s for delivery in the spring 0 1969. They will be used for operations to Kona, on Hawa and other short-field points. The order paves the way for late cargo services with 737QCs. Aloha at present operate BA One-Elevens in competition with the DC-9s of Hawaiian Airlines, which have just ordered a fifth—a Series 30.

An Iberia DC-9-30 (EC-BIM) was seen for the first time at Heathrow London recently. Ten of the airline's -30s have been delivered five more are due for delivery



AIR TRANSPORT

KEEPING THEM FLYING

ISSUED rather later than usual, the aircraft utilisation statistics for Australian airlines during the calendar year 1966 are still worth examination. They are published by the Department of Civil Aviation, Air Transport Policy Branch, and, though designed primarily for use by the department, copies are available for wider distribution.

As usual the most interesting feature of the tabulations is the very high utilisation obtained even by aircraft used on short-haul routes. Utilisations on scheduled service of the order of 3,600hr per annum can now be expected for, say, the TAA and Ansett-ANA Boeing 727s operating over average stage distances of more than 600 miles. So, also, can the 3,100hr for the Electras, with average stages of 500-550 miles. But the remarkable utilisations are those for the F.27s flying over average stage distances varying between 120 and 190 miles.

The highest annual 1966 figures were those for Airlines of NSW (3,194hr over stages averaging 193 statute miles), East-West (3,144hr over 145 miles) and MacRobertson Miller (3,066hr over 271 miles). Over the shortest average F.27 stage recorded, 122 miles, Queensland Airlines' aircraft averaged 2,711hr in the year. The shortest stage distance recorded for any aircraft was, not unexpectedly, the 38 miles averaged by the Sikorsky S-61 of Ansett-ANA; this helicopter put in 427hr during the year at an average block speed of 91 m.p.h.

UNCERTAIN 727 ACCIDENT CAUSE

THE reasons for the first in a group of let-down accidents involving the Boeing 727—that to a United Air Lines aircraft which crashed into Lake Michigan while approaching Chicago O'Hare on August 16, 1965—remain undetermined. The US National Transportation Safety Board, after one of the longest and most expensive investigations ever made, have been unable to offer even a probable cause for the fact that the 727 was "not being levelled off at its assigned altitude of 6,000ft." The majority of the wreckage was recovered from the lake, but the flight recorder and parts of No 3 engine were never found.

The report says that "a review of the available evidence has eliminated all causal areas other than those involving the operation of the aircraft. No evidence has been found that would indicate other than normal operation of the powerplants and systems at the time of impact. There is no evidence that will support a finding of sabotage, flight-crew incapacitation, or any malfunction of the aircraft. There is no indication that the weather played any part in this accident. . . . There has been no evidence . . . which will substantiate any pre-impact difficulties with the aircraft . . . nor was evidence uncovered Following this accident, and later ones in which excessive rates of descent were known to have been allowed to develop, extensive studies were started and changes were made in 727 piloting and training procedures.

Capitol in London Mr Peter Thwaites, formerly tours superintendent with BUA, is now sales executive with Capitol International Airways in London. He will act as assistant to Mr David James, UK sales director for the airline.

Technical Planning for A-I Captain K. Vishvanath, previously director of operations for Air-India, has been appointed director of planning (technical). His department will co-ordinate the technical requirements of the airline and be responsible for long-term planning. Capt Vishvanath is one of the five pilots who joined Tata Airlines, A-I's predecessor, in 1937.

Industry Training Two senior training development advisors —Captain D. Hayley Bell and Mr R. B. Paget—have been appointed by the Civil Air Transport Industry Training Board. Capt Bell, previously a test pilot with BAC, is concerned with flying training and related activities in flight operations. Mr Paget, who joints the board on February 1, will look after administrative and marketing training.

Ethiopian Postings Three important district management posts in Ethiopian Airlines have recently been filled by Ethiopian nationals. Mr Beyene Berhe, previously in Frankfurt, is now district manager in Rome; Mr Solomon Mengesha, previously in the Sudan, is now district manager in Frankfurt; and Mr Teklemariam Haile, previously at the airlines' headquarters in Addis Ababa, has been promoted to district manager in Khartoum, Sudan.

Eagle Board Appointments Air Marshal Sir Patrick Dunn is joining the board of British Eagle International to advise on safety and training in connection with the Boeing 707 fleet and Mr Derek A. Haslegrave has been appointed financial director. Sir Patrick, who was commissioned in the RAF in 1933, served pre-war as an instructor and during the war commanded fighter squadrons and an OTU and held appointments at the Air Ministry and with Fighter Command. Before retirement he was AOC No 1 Group, Bomber Command, and afterwards was AOC in C Flying Training Command. Mr Haslegrave joined Eagle as chief accountant in January 1965.

Members of the Edwards Committee recently went to Switzerland (see last week's issue, page 78) in one of the first of a series of informationgathering visits. They are seen here talking to members of the Swissair management in the boardroom at the oirline's head office near Zürich Airport. Facing the camera, from left to right, are Mr S. F. Wheatcroft (assessor), Sir Hugh Tett (deputy chairman), Professor Sir Ronald Edwards (chairman), Mr A. G. Manzie (secretary) and Captain F. A. Taylor





"I thought, well, if we are going to do this it would be great fun to fly it myself." Prince Philip with the Herald in South America

THE FIRST TIME I FLEW was in 1933 or 1934, and I suppose I have been interested in flying ever since. Not only that, but in 1936 or 1937, when the monarchy was restored in Greece, I spent holidays out there, and I stayed with my cousin who was then the Crown Prince, the younger brother of the King, and the father of the present King. He was learning to fly on Avro 504s, and so I used to go down to the station where he was learning to fly, and occasionally used to go up in one of them just as a passenger, just to be flown. This in itself was quite interesting as an introduction to flying.

In 1939 I came back from Athens to Poole in one of these Empire flying-boats. Then, while I was at school, originally I had no particular ambition as to what to do, but it so happened that, with the restoration of the monarchy in Greece, it was more or less expected I would do a certain amount of military training. My father had been in the army and, largely as a result of the flying which I had done, I thought it might be an idea to join the Air Force. Well, this was in about 1938, I suppose; but then it was discussed, and with one thing and another (and I think largely because of my uncle, my mother's brothers had both been in the Navy), I suppose that they knew more about it, and I found it was easier to go into the Navy. Well, I said all right, and went into the Navy, and then of course I had nothing to with flying until the end of the war other than flying from A to B.

But having got married, and then having been given commissions in the three Services, it seemed only right and proper that if I was going to wear the uniform of an Air Force officer I ought to at least learn to fly. This was how it originally started. I suppose it is the first occasion—I cannot think of any other—when a Harvard flew around with a trainee pilot and the Five Star flag on its side.

One thing led to another. I don't think I learned to fly as a sort of useful accomplishment, but I went through a kind of attenuated version of the ordinary Service course. It got slightly confused because every time the next phase had to be started, the Air Staff had to have a meeting about it, as if they could make any difference. If I said Well, we have got to do some night flying, there was absolute pandemonium, although they had agreed to the programme. Then there was formation flying—more pandemonium by the Air Staff, who thought that this was absolutely terrible; and I said If it is so terrible why is it you put your cadets through it, and they said Oh well, of course it's perfectly safe really. But every time the chap who was teaching me to fly, a fellow called Caryl Gordon, who is still in the Air Force, had personally to explain to the Air Force Board exactly what was going on.

Well, I then went from there on to twin engine, also as part of the training, and that was in an Oxford. It was a sort of continuation of the thing on the Harvard, and then from there I succeeded in converting on to a Dove, again as part of the training. Having got that far it seemed to me that the Dove

THOUGHTS ON FLYING

By the Duke of Edinburgh

HRH Prince Philip, Duke of Edinburgh, is well known as a qualified pilot and regular air traveller with a keen and critical interest in all aspects of aviation. He recently accorded an interview to Robert Blackburn for the BOAC monthly journal "Incentive 68"; it is appearing in the February issue, and (with slight abbreviation for space reasons) "Flight" reproduces it here. As will be seen, the Duke's comments are extremely informal in style, having deliberately been transcribed almost verbatim.

> was quite a useful aeroplane to use for ordinary sort of flying from A to B, which I did for quite a long time. Just about that time, the Queen's Flight were re-equipped from Vikings, and we went through the whole list of possible alternatives; it was quite interesting that the two contenders suitable for its use were the Heron, which was being built at that time as a private venture, and the Pembroke, which was the alternative. We looked at these two and came down on the side of the Heron, funnily enough, whereas the Air Force came down on the side of the Pembroke. I think events probably have proved us to have been right. We've still got a Heron in the Queen's Flight.

> Well, the result of that was that the first Heron came into the Flight and was fitted up really more or less the way I reckoned it would suit me; I had a two-pilot arrangement, and navigator sitting at the back. The other Herons were fitted up for single pilots with navigators sitting next to them. In fact they were extremely useful aircraft and I used them a great deal. Although it took me ten years to get a thousand hours—from training to about the time we had the Heron—this was almost entirely flying inside this country; I only did about two long flights outside the country, and that was from Bathurst to Tanzania and from Tanzania back home in a Heron.

> **On Safety** I feel very strongly that flying isn't a sort of black art which can only be done by devotees, or daredevils. It is a method of transport which it seems to me is as safe as any method of transport in these days. I don't see any reason why people shouldn't fly themselves, and I would certainly recommend my children to learn to fly, but there is a big difference between that and the sort of flying you then do; there is a vast difference between light aeroplane flying in good conditions in good visibility local to the airfield, and long distance flying in all weather conditions. Whereas I would be perfectly happy to fly solo in good weather in the local areas of an airfield, I would never dream of attempting long-distance flying under all weather conditions without a full outfit of preferably another pilot and a navigator.

> **Transatlantic Flights as a Crew Member** Well, I've only done three Transatlantic trips as a pilot—all in the Andover. But there really is nothing very spectacular about that; I mean you fly to Iceland, or via Stornoway to Iceland, to Sondestrom, Goose Bay and to Toronto. You can do it in two days. I prefer it personally because it is much more relaxing to be in your own environment. The other thing I prefer about it is that it breaks up this time-change. It is much easier to arrive in Toronto after two days rather than after eight hours with a five-hour time change.

> The sort of way we operate is that there are two Service pilots there plus a navigator, and then we have got three ground crew. That's the sort of aircraft end of it. We take

another, a second pilot, or counting me, a third pilot, because on a long trip, the second pilot and myself take it off and do the descent, approach and landing together, and then the other chap sits and monitors George in the meantime or part of the time anyway, which gives the other chap a break. Otherwise he'd be there all the time, or I would have to go up and relieve him, which is in fact what we used to do in the Heron days.

Concorde I am not going to fly the Concorde. I shouldn't think we are going to get a Concorde for the Queen's Flight in my time. But I would use it. Last year, for example, I tried to get to Winnipeg as quickly as I could and back again. Well, I flew commercial to Montreal, and then got a Department of Transport Jetstar to Winnipeg. And then took a commercial back. I would do this because it had to be fitted in. I would certainly do it just to be there for a day or two days, and back again; but if I am going to be there for a week, well why not take a couple of days to get there and back? It doesn't make all that much difference.

Conversion Training and Helicopters I converted on to the Herald to begin with, with Hazelden, who was then the chief pilot of Handley Page, because I borrowed two Heralds to fly round South America; they were actually crewed by BEA and



I enjoy the little ones; I have flown the Turbulent . . ."

hey were the ones which eventually went to the Scottish routes. I wanted to go to South America. We scratched our heads how to do this, and of course the most convenient way to do it was by air in our own aircraft because the thing works much more easily. If you try and fit into commercial schedules you set in the most awful muddle. So we borrowed these two and thought, well, if we are going to do this it would be great in to fly it myself. I did about ten or fifteen hours with Hazelden and went through the whole process of conversion, and got it put in the ordinary way into my licence. Of course when the Andovers came along I did exactly the same thing. Just did a complete normal civil pilot's conversion course. And I have flown other aircraft. I flew the BAC One-Eleven, but not just flying it from A to B. I did two or three landings and that sort of thing, but I didn't convert on to it.

It's difficult enough to get time to do the flying, so the time hat I have I prefer to put in on the aircraft that I am able of y. If I have been off flying for any length of time, I try and get in some continuation and just do a bit of singleengined emergency things, once a year. I certainly do a effesher on helicopters every year, because on the whole you can't plan on their use during the winter. Mind you, I enjoy helicopters very much. I learned some years after taking to hed wing, but I think the great thing about helicopters is that is, so to speak, real flying. With an aeroplane the thing has get to be travelling through the air in order to sustain itself, and of course you are committed to this business of having to so forwards the whole time. Whereas with a helicopter, there is the added advantage of being able to select whether you want to go forwards, backwards or sideways at will. Well, people say, isn't it much more difficult? I suppose there is a slightly greater degree of co-ordination necessary, but not all that much. I think that when you are doing, for instance, an approach pattern by instruments in the dark in a fixed-wing aeroplane, the amount of co-ordination necessary is the same as flying in a helicopter, although obviously just taking off and flying from A to B in a fixed wing probably requires less co-ordination.

Incidents Once in the Dove we had an engine that didn't look as if it was functioning but in fact functioned perfectly well and we got in without any difficulty. I don't think we ever had anything in the Heron which gave any cause for concern. Now that you mention it, I hadn't really thought of it. In the helicopters I had once an increase in oil temperature, rather suddenly, and a loss of power which I noticed almost immediately. I noticed the loss of power as we took off and mentioned it to the chap who was sitting in the next seat, and said I don't think we've got the power. I was looking where we were going, so he had a good look at the dials when I mentioned it, and saw that the oil temperature was going up, and reckoned that we ought to come down. Of course the great advantage in a helicopter is that you can put down immediately in somebody's field.

Apart from that, we got held up by weather once. We got into bad weather flying from Edinburgh to Glasgow just at Kirk o'Shotts, and the cloud came down so we had to land in a football field, and we hired a car and drove off that way. But this is one of the advantages.

In South America in the Herald—we took off from Brasilia just at about 1,000 feet I suppose—we got a fire warning light in the engine on my side, and I looked out to see and I said "It looks all right to me, there's no smoke or anything, no blisters appearing on the paintwork." But by that time they had carried out the BEA drill of course, and shut down the engine and flooded it with Graviner and everything else, so there we were stuck with one engine and had to go back again. Inevitably it turned out that it wasn't anything to do with the engine at all, but it was to do with the fire warning plug. Owing to a very sudden change in the climate we got a certain amount of condensation inside the plug, and that was enough to set it off.

And I expect you heard the other day, we had that engine that just stopped altogether.

Enjoyment I enjoy the little ones; I have flown the Turbulent, which I suppose is the smallest one. It had been dolled up a bit for racing, because we borrowed one from the Tiger Club, and the Equerry I had at the time was interested in air racing, and so I entered it, and he flew in my colours. I flew this thing one day, but what I didn't realise was that they had cut down the sort of windscreen—it was open and I wound the thing up and got into it. Nobody mentioned a hat or a crash helmet at that time, and I set off, climbing at about 70 knots, so by the time I got to 90 knots I thought I was going to be scalped, because it just caught me across the head.

I have done a certain amount of Chipmunk flying, of course —I started to learn in a Chipmunk, which I enjoyed very much. I have flown a lot of little aeroplanes since then, like the successor to the Turbulent, a little two-seater—the Condor and I flew the Victa, which I thought was the most delightful aeroplane. I am hoping to fly the Beagle—well, I have flown the big Beagle, but I am hoping to fly the Beagle Pup. When I say fly, I mean take off and land, as opposed to just handling the thing. Of course, the jets are great fun—the 125 and the One-Eleven, which are most delightful aeroplanes to fly. I think they are all fun. I enjoy the business of flying.

Gliding There are masses of things I would like to take up, but there simply isn't time, and specially for a thing like gliding which is very much a spare-time activity. The only reason I fly is because it is useful for getting from A to B. You combine business with pleasure as far as I am concerned when it comes to flying, but I think with gliding it would be much more difficult.

On Actually Piloting On the whole I don't believe people really realise that I do fly. I think there is a sort of residual attitude amongst people who don't fly, that anybody with a

THOUGHTS ON FLYING ...

title is much too stupid to do anything like that, and therefore they think that this is a great sort of publicity gimmick. They are being told that I fly, and if you look at any reports, it usually says something, in a rather patronising way—"His Royal Highness was allowed to take the controls for part of the flight." To my mind this merely represents what the general public seem to think. I don't think they really hoist it in that I actually fly the aeroplane.

Choice of Aircraft If I am going to go to the Moon, I presumably will have to get into a rocket, but the fact that all these things are possible does not necessarily mean to say that I shall be necessarily committed to having to fly them. Whatever I fly will be for the purposes of getting from A to B. For instance, about converting to jets-one of the reasons I didn't go on with it, I mean. I flew a Vampire, I flew a Meteor, really merely just to find out what they were like in the same way that I flew the Turbulent or the Condor. One of the reasons I gave it up was that I had no purpose in it, I couldn't use the ability, so what was the point of my flying a Vampire? I couldn't fly myself from London Airport to Manchester in a Vampire-it's pointless. Therefore I am unlikely to convert to a VC10 or a 707 because the chances of my actually flying it for any purposes are entirely remote. But, for instance, if Hawker Siddeley or BAC bring out a jet replacement or a jet capable of the same sort of short field performance and the same sort of economic conditions as the Andover, well then I think I shall probably convert to that. But until they produce it, why should I concern myself with flying a Concorde if the thing isn't practical from the point of view of my continuing to do so?

Business Travel I think that people generally don't appreciate the amount of time which businessmen—industrialists, commercial people, bankers—spend in travelling. In fact, the airline world is really sustained by these people, who are all on company accounts, and no private individual in the normal course of events can fly anything like as much.

I think that you have got to be a very big corporation to warrant owning an expensive aeroplane, because you have got to use it a very great deal to get the benefit from it. This country is an expensive country to fly in, because it is never really quite big enough if you have got a big aeroplane. On the other hand, if you have got an aeroplane that is suitable for this country, it is not really suitable for long-distance travel abroad, as I discovered with the Heron. It is too limiting, it takes too much time.

So I believe that in the future if aircraft come along like, for instance, the Jetstream, which is cheap to operate and convenient in size and range, it would be a tremendous advantage to businessmen to use aircraft over which they have personal control the whole time. I am sure there is more scope, quite obviously there must be, but don't forget that anybody who is doing any form of commercial or industrial business, is doing a pretty full-time job and to say Well, look, why don't you take a week off and go out to South America or something, well, it is a bit difficult, as you have got to leave the office behind. You don't know what's going to happen when you get out there, and so on. I think that I am all for people travelling, and I agree with you that there is scope, but what I wouldn't like to say categorically is that businessmen ought to go out. I think it is their business what they do -I think it is in the nation's interest what they export, yes, but it is their business.

Progress People are going to be more interested in flying at a reasonable cost than in flying at an unreasonable speed, and don't forget that every mechanical invention, particularly in the transport field—take railways or ships or motor cars reaches a kind of optimum. After all, ships have been doing 30 knots for 50 years. Somehow this appears to be a kind of optimum. If you want to go any faster than that, the average cost is so great that it is simply not worth it. The same with railway trains. They reach a kind of optimum of performance, after which it is too expensive or too technically difficult to make it worthwhile. Look what is happening to the SST in the States; there has been a constant quibble about its cost Well nobody has quibbled about the cost of sub-sonic aircraft because they are still within the envelope. Once it gets to the SST cost everybody says Well, is it really worth it?

It is very difficult to predict what the optimum is going to be. There is no doubt that technological advance will brin down the cost of supersonic travel in the next generation, but it seems to me that, unless you can really get the value out of extra utilisation, it is beginning to knock on the edges of what looks like a sort of natural plateau. This plateau, th moment of diminishing returns-we are approaching it in the ordinary military aviation world very rapidly. The cost of the development of new aircraft is such that either we have got h think of a cheaper way of doing it or we have got to think ou what on earth it is we are trying to do. If it is for interdiction or for interference with transport aircraft, or if it is to attac infiltrators or forward airfields, then you probably don't wan a highly sophisticated aircraft. And the more expensive th individual unit becomes, the less you are prepared to lose in therefore the less you are prepared to use it. The cheaper th thing is and the more you have of them, the more you an prepared to use them, and to lose them. And it seems to me that in any military equipment concept, it is this ability to los which really matters. One of the reasons for the doctrine of the Fleet-in-being, for instance, is that no one was prepared to lose it. They weren't prepared to have a fight because the units were so important and valuable that they weren't prepared to lose them.

If you are going to talk about mobile forces, I think you want to talk about amphibious forces basically...this tota dependence on the ability to reinforce by air is marvellous in theory, but I think in practice has certain limitations. Well this is for other people to decide.

The Aircraft Industry It involves such a large portion of the economy to break-even on a big project that the tendency is not to start because you may be wrong. Now, the answe to this up until now has been: well, if it is worth doing and we can do it, we will do it, and we will do it with a subsidy to make up the difference between, for instance, the United States, which if it gets it right, has such a long run that it can make sufficient money out of it to sustain the failures. Here, of course, owing to the run not being long enough and the taxa tion system being what it is, in a sense no one can accumulate enough cash in order to finance the following project or to finance a failure. If you have got a small industry, you have got to handle it differently.

There are all sorts of suggestions as to how this might better done in this country. I suspect that we might be bette advised to say, as a matter of policy, that we will design an build all our military aviation equipment from helicopters an hovercraft, right up to transport aircraft, and that there will be an obligation on the Ministry of Defence to design and order those aircraft in this country, and that the design should be done in a central design establishment, so that you have a permanent design team always designing the next product Asking for tenders is a most wasteful way of doing it, if you come to think of it. If you try and do the research necessar to produce a TSR.2, and then you don't get the contract is build it, well then you've wasted millions. It is a most ludicrous way of doing it.

Much better to say, look, there's one group of people dom it, and we will buy it whether it works or not. Then you ca have an infernal row as to why it does not work, and y order another one which you hope works better. Then I thin you can put out the construction of this thing to tender. Yo say, well we have done all the design, here is the prototyp you build the thing. Then they tender for the cost of building it. In the meantime, out of that they can then develop civ aircraft, which then would be built competitively, and yo would not put any obligation on either the Services of nationalised airlines or anybody else. You would not put a pressure on them to buy the commercial equipment which produce, because this would have to be built competitive with the rest of the world. But the industry would be su tained by the knowledge that the military equipment would have to be built here. The central military design establishmen would be a government establishment.

Letters

The F-111 and Europe

From Air Marshal Sir Patrick Dunn, KBE, CB, DFC, RAF (Retd) SIR,—On February 16 the Prime Minister, in his preamble to the measures to reduce public spending, enunciated certain principles relative to defence. Major foreign policy decisions, he said, are a prior requirement of economies in defence expenditure. Defence must be related to foreign policy and not be asked, in the name of foreign policy, to *undertake commitments beyond its capability* [my italics]. Reduction in defence capability, he continued, must be based on a review of the commitments which the Services are required to undertake.

Among the ensuing decisions were, first, an accelerated withdrawal from East of Suez, to be completed by 1971, but retaining a general capability, based in Europe, which could be deployed overseas as circumstances demanded.

Secondly, he reaffirmed that our security (and therefore commitment) lies fundamentally in Europe and must be based on the North Atlantic Alliance.

The Government was determined, the Prime Minister said, that our commitments and the capabilities of our Forces to undertake them should match and balance each other.

Should it be necessary to go to the help of our friends or spring to the protection of our interests east of Suez after 1971, the Royal Air Force should have the Phantom, the Harrier, possibly the Jaguar and certainly the ageing "V"-force supported by transport and maritime forces with which to do so. The F-111 would have been a valuable adjunct in this enterprise but not essential to it. Therefore, capacity should match commitment. However, the F-111 was an essential component of the British contribution to the forces of the North Atlantic alliance in Europe. It was ordered so as to provide a contemporary strike/reconnaissance aircraft, able to make and survive a deep penetration through sophisticated European defences in all weather conditions. It is an absolute requirement in the European theatre. No other aircraft has its operational scope and relative invulnerability. Yet the F-111 has been cancelled though the commitment in Europe remains unchanged. This contradicts the Prime Minister's vital principles in the vital theatre.

Britain should, therefore, surrender the difficult air tasks to the Americans (assuming they would take on yet more of the burden), or perhaps to the French, Germans, Italians and our other NATO allies. But that would be an unhappy and unworthy position.

Time, it was said, would be needed to work out the precise implications (of the major changes ordained) and these are to be embodied in a White Paper.

It takes no time at all to work out the implications that count. First, without the F-111, the Royal Air Force will have no aircraft likely to survive a useful two-way strike/reconnaissance mounted in Europe. Secondly, the RAF will not allow another to relieve it of its duty. Therefore, unless it is re-equipped with the F-111 or comparable alternative (and there is yet time for sensible counsel to prevail) it would go into action in ageing aeroplanes as it did in 1939 and with the same result.

Cookham Dene, Berks

PATRICK DUNN

[Sir Patrick was AOC No 1 Group, Bomber Command, from 1961 to 1964 before becoming AOC-in-C Flying Training Command. He is referred to in an item of Air Transport news on page 121.—Ed]

Air Transport and the State

From Sir Frederick Tymms, KCIE, MC, FRACE

SIR,—May I trespass on your space once more, to comment on one aspect of the article by M. J. Hardy in your issue of January 4? It is important to have a clear understanding of the issues—at this time particularly. Let me say that I am in sympathy with much in Mr Hardy's vigorous and professionally informed article, in spite of the fact that it appears to knock the bottom out of the principle I attempted to explain in my letter (*Flight*, December 14). I am afraid it does not go deep enough for that. The rock bottom remains. Euclid expressed it: "The part cannot be equal to the whole."

If the State (which means Government, Parliament and the people) decides that a particular enterprise is the business of the State, it is a contradiction to set up an *independent* authority to decide what part of it the State may be allowed to operate. John Citizen does not feel himself under-privileged, or a second-class citizen, because he is not allowed to set up an independent postal service, or dig his own coal mines or produce and distribute electric power. Still less does anyone suggest that there should be an *independent* authority to decide how, when and where he should be allowed to do these things. Monopoly is inherent in nationalisation; and it is established by the State, not by the people who operate or administer the system.

Wherein lies the difference? Air transport is an undertaking in which a degree of competition can be to the benefit of all-the country, the operators and the users. Everyone knows that unlimited competition has proved to be, and is, in most cases, disastrous. Hence "regulated competition." How is the contradiction to be avoided? If the State must be involved as an operator, I suggest that the State should define the field (not the "area") open to private enterprise. The citation of the examples of mixed economies in Canada, France, Australia and Japan, however successful they may be, can only be relevant if evidence is produced that CPAL, Ansett-ANA and UTA, for example, came into the field of their own unimpeded volition or by decision of authorities independent of the Governments responsible for establishing or preserving the system of State operation. I suspect that the field of operation of these independents was carefully prescribed by their Governments, and, in that case, their relationship with the State organisation could hardly be that of equals.

To press for an independent licensing authority to operate equally for State and private enterprises is merely to attempt to open a side door when the State has barred or restricted the front door. If the energy which is devoted to pressing for an independent Air Transport Licensing Board, as the panacea for all our ills, were devoted to creating the basic condition in which a Licensing Board could be independent, the outcome might be more favourable.

F. TYMMS

Non-American Aircraft in US Service

Farnham, Surrey

SIR,—Roger Bacon's comments on the Handley Page Jetstream (Straight and Level, January 11), whilst being praiseworthy, were slightly inaccurate.

de Havilland Aircraft of Canada have supplied the United States of America with the following military aircraft: 968 DHC-2 Beaver U-6As; 223 DHC-3 Otter U-1As; and 164 DHC-4A Caribou C-7s.

In addition, a number of Otters have been supplied to the US Navy under the designation U-1B; the US Army have paid equal shares with de Havilland Canada and the Canadian Government in the development of the DHC-5 Buffalo; and four prototypes were delivered to the US Army for evaluation under the designation CV-7A. Lastly, but not least, the beloved Tiger Moth was built by DHC to USAAF order under the designation PT-24. Some 200 (c/ns 1303 to 1502, USAAF serials 42-964 to 42-1163) were built, but were supplied to the RCAF.

Whilst Canada is on the North American continent,

LETTERS

most of my Canadian friends would be most offended if they were not regarded as "non-American."

Despite these nit-picking criticisms, Roger Bacon's column is still as entertaining and refreshing as ever.

E. T. WILSON Reading, Berks

Roger Bacon comments: I stand corrected. The US Services have in fact bought six non-US aircraft types in the last 50 years-all of them, since the DH.4, de Havilland. No wonder Hawker Siddeley markets the HS.125 in the States as the DH.125.

Keeping it Simple

Sir,-Once again Mr Norman Jones, in his letter "Fun to Fly" [January 11], has shown himself to be one of the few people who can get to the heart of the matter where British light aircraft are concerned. I support wholeheartedly his opinion that they should be simple, unpretentious and adaptable to all kinds of landing fields.

It seems that the approach speeds and landing distances of light aircraft today are increasing at an even greater rate than the prices. One used to fly older types, such as the Auster, in the confidence that if the engine stopped you could get it down in a very small space. Landing in the same field in a modern tricycle, you would probably plough through the far hedge and do your steerable nosewheel no good at all.

Most weekend pilots in Britain do not want glittering and expensive aircraft, in the same way that we do not want glittering and expensive cars. We want something simple, rugged and, above all, economical. The Beagle Pup, which was supposed to save the day, is just another attempt on a market that has been well conquered by the Americans. Mr Jones's Condor is part of the way there, but is only a beginning-I hope. What about something similar to the Messenger or even the Autocrat, numbers of which are still getting three people airborne on 90 h.p.?

With an eye to economy instead of sophistication, what light aircraft industry there is left in Britain could be well supported by the great numbers of people who would, surely, flock to the flying clubs if they could learn to fly on a modern aircraft without the unnecessary expense of today's all-metal flying armchairs.

Churchdown, Gloucester C. R. BARNETT

EAA and Comet Charters

SIR,-I have to refer to the brief paragraph relating the purported operation of Comet charters at non-IATA rates by this corporation (Sensor, page 3, Flight, January 4).

Such inaccurate editorial is extremely harmful to East African Airways' image, particularly as the corporation has long been a full member of IATA and consequently could never consider a breach of the association's regulations.

East African Airways is certainly not planning to operate any Comet 4s on UK-East Africa inclusive-tour charters at non-IATA rates. Nairobi, Kenya

R. E. YOUNG Commercial Director. East African Airways

[Our information is that East African Airways will be operating these flights in the guise of its wholly-owned non-IATA subsidiary SKAT.-Ed]

Inside Story Revealed

SIR,-I know all about the Hurricane because I once built a plastic model of a Hawker Hart and couldn't get the stick-things between the wings right, so I left them off. The things under the wings of Roger Bacon's Hurricane (page 38, January 4) represent an unsuccessful attempt on the part of V*****s to provide RATOG for aeroplanes which took off quite well without it. The Air Ministry, in their wisdom, perpetrated a Murphy by

FLIGHT International, 25 January 1968

installing the contraption back to front, resulting in an outstandingly short landing run. CA release was compromised by an unfortunate propensity for spitting-out two-pound chunks of propellant waste. With true British aplomb and cost-effective motivation, both Vickers and the Ministry declared that the monstrosity had been intended as a cannon from the outset; with the weapon strapped to their aeroplanes the pilots of 6 Sqn were "so bloddy frightened of the Hurri that the tanks were a piece of cake" (an un-nameable Polish pilot).

Please tell the gentleman who wrote the caption to the photograph of the Martel-armed Buccaneer that it'll take more than one of these to knock out an armoured carrier-three Kamikazes in five days, with a hangar fire on top of that, left Formidable a bit short of aircraft but fully operational.

Weymouth, Dorset J. D. BROWN

"Flight" Scooped at Last

SIR,-Flight is held in high esteem at this college. Imagine our amazement at seeing the cartoon on page 70 of your issue of January 11.

Please find enclosed page 19 of our magazine Potential for winter, 1962.

This was the cartoon on page 19 of "Potential"



Are your ace reporters perhaps ex-Cranfield men? Could it be that they have been looking through their back copies of Potential? The variants of aircraft featured in our Cranfield Society cartoon are, of course, much earlier than your present-day models (although from the same stables), and the method of evasion has apparently been developed somewhat in the intervening time.

We are looking forward with great interest to your next issue. A scoop on M Bleriot's proposed Channel crossing, perhaps?

College of Aeronautics,	DAVID BROWN,
Cranfield, Beds	Editor, "Potential"

IN BRIEF

From No 216 Sqn comes notification of a reunion on April 6 to celebrate its fiftieth anniversary as an RAF squadron. Ex-members may obtain details from the Adjutant, No 216 Sqn, RAF Lyneham, Chippenham, Wilts, but numbers may have to be restricted and early application is advised.

The Shuttleworth Veteran Aeroplane Society writes to say that membership is "open to all interested in actively supporting the preservation of historical aeroplanes and associated equipment." Details are obtainable from the hon secretary at Old Warden Aerodrome, Biggleswade, Beds.

DIARY

Jan 26	RAeS Isle of Wight Branch: "Work of the Engineering Industries Training Board" (joint meeting with IoW institu-
Jan. 29	tions): Technical College, Hunnyhill, Newport, 6.30 p.m. RAeS Historical Group: "Air Photography," by Cyril Peckham:
Jan. 29	4 Hamilton Place, London WI, 7 p.m. RAeS Loughborough Branch: "Management of the Buccaneer Development Programmers" by D. Revent Strenger 2
Jan. 30	University, 7.30 p.m.

University, 7.30 p.m.
RAeS Test Pilots' Group: "The X-15 Programme," by Maj
W. F. Knight, USAF; 4 Hamilton Place, London WI, 6.30 p.m.
RAeS Belfast Branch: Film night; Ashby Institute, Stranmillis
Road, 6.30 p.m.
Kronfeld Club: "The RAF Museum," by J. M. Bruce; 74
Eccleston Square, London SW1, 8 p.m.
RAeS Bristol Branch: "Engine Development in an Operators'
Market," by J. L. Edwards; BSE Sales Lounge, Patchway,
5.30 for 6 p.m.
RAeS Brough Branch: "Gliding," by F. Irving; Kingston
Room, Royal Station Hotel, Hull, 7.30 p.m.
RAeS Christchurch Branch: "BAC One-Eleven-User's View,"
by S. G. Websper; Town Hall, Christchurch, 7.30 p.m.
RAeS Southampton Branch: "Helicopters," by Prof. J. A. J.
Bennett; Engineering Lecture Theatre, University, 8 p.m. Jan. 30

- Jan. 31

127

Furnishing and Finishing



"Flight" special review

HE GROWTH IN NUMBER AND FREQUENCY of airline services over the years has enabled the traveller to be increasingly selective in his choice of airline and aircraft. As a sult, décor and comfort as well as cabin service are now ablished as being important considerations by operators maintaining load factors. Two good examples of passenger peal are the VC10 and Trident, both of which have taken siness from other airlines because of the degree of comfort ey offer the traveller.

Perusal of the following pages will show that in the field aircraft furnishing and finishing, British suppliers offer an normous range of first-rate equipment for passengers' comnt and safety. But it is up to the airlines to provide good rvice and convenience; and, in this respect, the facilities they fer vary considerably. On international routes on both sides the Atlantic the difference in quality of certain items of mishing is most marked—seats, cabin signs, décor, ventilaon, passenger address systems and cabin luggage facilities to but a few of the items on which some operators could prove. The availability of efficient equipment is not in testion, but not all airlines select it or make the best use of when they have it.

British seats are known for their comfort and lightness, ight having been reduced to well below 201b per unit. The olution of p.v.c. in recent years has meant a marked reduction in the weight of passenger fittings, particularly for insulation and decorative finishes. Other companies provide complete furnishing schemes for aircraft interiors, a field in which until recently the Americans had the lion's share of business. British galley, bar and buffet units are in service with airlines of many countries. Plastic materials are widely used for interior fittings, but it seems a pity that some airlines allow these to become shabby, by failing to keep them clean.

Air transport is, and has been for a good many years, one of the fastest-growing industries in the world. There is every reason to believe that this trend will continue. The next few years will see the major airlines re-equipping or augmenting existing fleets with two new categories of aircraft-Mach 2-3 airliners and Jumbo jets. The establishment of two speed plateaux, supersonic and high subsonic, with virtually identical aircraft will mean that airlines offering extra comfort and relaxation will win the passengers. It is likely, therefore, that operators will demand of airliner manufacturers an even greater degree of interior "custom-building" than they do today. British companies manufacturing furnishing and finishing products and services will get, it is hoped, a large share of this important business. The directory of companies, with brief details of their products, which appears in the following pages usefully indicates the variety and ingenuity of what these concerns have to offer.

ading picture, forward cabin and bar of an executive One-Eleven furnished by Marshall of Cambridge. Below left, first-class lounge ^{It} for Swissair DC-8-62 by Field Aircraft Services. Below right, Rumbold seating, in an HS.748, upholstered in British Replin fabric



Bowater Packaging's containers in use with a microwave cooking system. The range includes board, plastic-laminate and all-plastic plates, dishes and trays of many shapes and sizes

FURNISHING AND FINISHING ...

COMPANIES AND THEIR PRODUCTS

128

A.E.I. Lamp & Lighting Co Ltd, Melton Road, Leicester (Leicester 61531) Capless, 10W 28V lamps with granulated bulbs for reading and other interior lights; miniature fluorescent flight deck lamps.

Aerogalley Ltd, Gatwick House, Horley, Surrey (Horley 5353) Suppliers of galley equipment and fixtures including electrical units, bar boxes and tray carriers; Perspex, Melamine and other tableware, foil containers, non-slip tray mats and non-woven fabric cloths, and air sickness bags. Agents for Willi Lermer, and Sell Haus und Kuchentechnik.

Aerolex Ltd, Bridge Road, Camberley, Surrey (Camberley 5451) Cargo lashing equipment; passenger seat belts and crew harness.

Airborne Upholstery Ltd, Airborne Works, Arterial Road, Leigh-on-Sea, Essex (Southend-on-Sea 525265) Seats, seat belts, and seat upholstery and facings are manufactured to specification.

Aircraft & Commercial Reinforced Plastics Ltd, Eldorado Works, Southern Trading Estate, Gresham Road, Staines, Middx (Staines 51235) Meal trays; reading light panels; toilet seats, tops, covers, surrounds and drip trays; wash basins—manufactured from chopped-strand mat, glasscloth and fire retardent polyester resins with colours mixed in.

mixed in. Aircraft Furnishing Ltd, Hersham Station Works, Walton-on-Thames, Surrey (Waltonon-Thames 26261) Developed from their, 500 series BOAC VC10 economy class seat, Aircraft Furnishing's Airfurn 700 series is a single spar, lightweight, tubular frame unit, featuring Pirelli webbing, hydraulic recline and padded tables, and weighing 17.5lb a seat place for a triple unit. A re-styled version weighs 20.5lb a seat place. Aircraft currently being equipped with these multipurpose seats include DC-8-62s of SAS and DC-9s of Swissair.



Aircraft Materials Ltd, Midland Road, London NW1 (01-387 6151) Adhesives and sealants; tie-down harness and quick-release mechanisms; safety harness; fasteners; seat belts and fittings.

Airmed Ltd, Edinburgh Way, Harlow, Essex (Harlow 24331) Lightweight air and ground crew headsets; quick-donning oxygen masks for attachment to aircrew headsets, disposable passenger emergency oxygen masks. Airscrew-Weyroc Ltd, Weybridge, Surrey (Weybridge 45599) Weydec and Hardec decorative panelling material. Fan Division: a new type of mixed-flow (axial/radial) fan has been developed for cabin ventilation; recent orders include fans for the Jetstream, HS.801 and BHC SR.N4.

Amplivox Ltd, Beresford Avenue, Wembley, Middx (01-902 8991) Hand microphones for recording and passenger address.

Antifyre Ltd, Shrewsbury Road, Acton, London W3 (01-992 1166) Portable fire extinguishers.

Arlington Plastics Development Ltd, South Road, Harlow, Essex (Harlow 24611) Vinyl coated fabrics for panelling and upholstery; textures available, in single and multicoloured effects, range from leather grains to silk and tweed fabric simulations. Minimum orders to ARB specification from 300yd to 500yd; normal delivery time about four weeks.

Attewell & Sons (Engineering) Ltd, B., Ridge Way, Iver, Bucks (Iver 2030) Perspex tableware to standard or customer designs; passenger service panels in rigid p.v.c.; small toilet fittings in Perspex; windows and window frames.

Avdel Ltd, Welwyn Garden City, Herts (Welwyn Garden 28161) All types of rivet and fastener for metal, rigid plastics and timber sheet, including Chobert rivets for riveting into glass fibre materials; Pip positive self-locking quick-release pins for cargo pallet and seat attachment.

Aviation Traders (Engineering) Ltd, Municipal Airport, Southend-on-Sea, Essex (0702-49471) Passenger gangways; passenger baggage and cargo handling equipment; conversions of all types of aircraft to freighter or passenger-cum-freighter role, complete with above-floor freight systems and large cargo door. First- and economyclass seats.

BXL (Bakelite Xylonite) Ltd, Brantham, Manningtree, Essex (Manningtree 2401) Fromoplas high-impact rigid p.v.c. sheet used in the interior trim of a number of aircraft, including the BAC One-Eleven, VC10, Super VC10 and in the full-scale Concorde mock-up and prototypes.

This galley unit—by C. F. Taylor (Metal Workers), for a Central African Airlines' One-Eleven—makes use of Aeroweb aluminium alloy honeycomb panels bonded with Redux: both are products of CIBA (A.R.L.) Ltd Baxter Woodhouse & Taylor Ltd, Woodside Poynton, Ches (Poynton 2261) Straig and corrugated window blinds; electrical heated carpet underlays; interior units for VC10, Super VC10, One-Eleven, Tide and HS,125; lightweight, flexible and pa fabricated air ducting.

Baynard Press Ltd, 32 Chrysell Rog. London SW9 (Reliance 1211) Flight information booklets.

Beake Ltd, J. A., Old Cable Works, King ston Road, Leatherhead, Surrey (Leather head 5594) Interior design and fitting-ou specialist; on-site working parties for refurbishing or complete conversion. Service include curtains, floor coverings and modications, food trays and boxes, insulation and soundproofing, panelling, seat modified tion and servicing, and toilet fittings.

Bell's Asbestos & Engineering Ltd, Bestob Works, Slough, Bucks (Slough 23921) Bul head sealing tapes and flexible connector for fire protection, and fireproof hoses an ducting; asbestos felt and polyurethas foam insulation; oxygen breathing hose connecting sleeves and clips; non-stai ozone-resisting silicone sponge strip fa panelling and trim; Terylene-reinforca neoprene rubber flexible connectors fa toilets; lightweight flexible ventilatin ducting and connectors.

Benson Aircraft Interior Furnishing In J. J., Southend Airport, Southend-on-Sa Essex (Southend-on-Sea 544605) Furnishin contractors; seat cushions, squabs, headres and covers.

Bibby & Baron Ltd (inc Bibby & Kada Ltd), New Bridge Mills, Bury, Lancs (Bu 2101) Kard-O-Pak and Kard-O-Scal at tight and waterproof motion sickness ba incorporating fully heat-sealed thermoplas liner with strong Kraft outer. Other bas with partial wax protection, also available Suppliers to all major airlines.

Bowater Packaging Ltd, Paper Produc Division, French Street, Sunbury-on-Thame Middx (Sunbury-on-Thames 5272) Disp able board plates and trays; aluminium fa containers; in-flight snack cartons; min wave oven plates and trays.

Bridport-Gundry Ltd, Bridport, Don (Bridport 2244) Products include a pocket nets, hat rack nets, baggage a cargo stowage and retaining nets, synthat plaited cordage for parachute trimming a other aviation applications.

Bristol Aeroplane Plastics Ltd, File House, Bristol (Bristol 693811) Glass-file cabin ducting; plastics signs and data panels

Britax (London) Ltd, Chertsey Ros Byfleet, Surrey (Byfleet 43141) Doors safety straps.

British Oxygen Aviation Services, I Pinnacles, Elizabeth Way, Harlow, Em (Harlow 26891) Constant-flow passen breathing mask, approved for use up 41,000ft in portable, fixed and drops oxygen systems; quick-donning crew may with diluter demand regulators; potte and fixed installation oxygen systems b business and light transport aircraft.

British Parachute Co Ltd, Chapelio Street, Manchester 1 (Ardwick 2414) Sala harness.

British Replin Ltd, Belvidere Terrace, A Scotland (Ayr 67271/2) Specialist were of aircraft upholstery fabrics. Spec designs, textures and colours woven to on for early delivery. Long-standing us include many international airlines.

Burndept Electronics Ltd, St Fidelis Ra Erith, Kent (Erith 39121) New addition to the Sarbe range include the Comp Beacon designed for VHF transmission the international distress frequencies, produced to suit the needs of the probusiness and light transport aircraft operation Power output is 100 milliwatts mean (milliwatts peak), endurance 24hr, and wea 25oz complete with mercury battery. As battery available.

Bury & Masco Industries Ltd, Hudcar M Bury, Lancs (Bury 2262) Carpets and fel upholstery.

WRNISHING AND FINISHING ...

BA (A.R.L.) Ltd, Duxford, Cambridge wston 2121) Araldite epoxy resin coldhot-setting adhesive for metals, surface ting for protecting metal and other fraces, and laminating resin for glass nforced plastics; Aerolite ureaformaldenet, and Aerodux resorcinolformaldehyde ins are both principally adhesives for od.

W.C. Equipment Ltd, Kings Grove, idenhead, Berks (Maidenhead 20411) porescent lighting fittings.

merer Cuss & Co, 54-56 New Oxford reel, London WC1 (Museum 4861) Cabin cks.

go Aids Ltd, Station Approach, Whyteje, Surrey (Bywood 2321) Freight lashing sigment.

rr Fastener Co Ltd, Stapleford, Nottingm (Sandiacre 2661) Fasteners.

rington & Dewhurst Group Ltd, 24 eat Pulteney Street, London W1 (Gerrard 6) Materials for headrest covers.

don-Docker, a Division of Pinchin Johnt & Associates Ltd, 380 Richmond Road, ngston upon Thames, Surrey (Kingston on Thames 1234) Finishes and protective utings for aircraft, hovercraft and comnents; fluorescent paints for safety and ergency applications.

yton-Wright Ltd, Howard, Wellesbourne, prwickshire (Stratford on Avon 4222) ylastic plastic/metal flexible trimming p, consisting of bright metal foil peranenty encased in a transparent plastic rusion; available in a variety of sections i finishes; applications include shelf edge m and table edging. Clatonrite glazing p for windows in unpressurised aircraft. kastrip self-adhesive sponge strip.

atour Seats Ltd, 25 Bridge Road, we, Farnborough, Hants (Farnborough 181-2-3) Seat trim specialists: aircraft holsterers. Seat covers.

opers Plastic Foams Ltd, Stamford orks, Ashton-under-Lyne, Lancs (Ashtonder-Lyne 5681) Foam carpet underlay; tible and rigid polyurethane foams.

& Son Ltd, John, Coxorian Works, disle Road, London NW9 (Colindale I) Sole distributors for ICI (Hyde) proof p.v.c. leathercloths, such as Vynide side panels, seat backs, and headlinings; Ambla for armrests. Recent applications ude the Concorde mock-up.

ators Ltd, Plansel Works, Sheerwater, king, Surrey (Woking 3971) Thermostics mouldings and extrusions.

ssley & Sons Ltd, John, Dean Clough Is, Halifax, Yorks (Halifax 2711) Carpets.

eman Ltd, Richard, 325-327 Latimer Id, London W10 (Ladbroke 7455) ylic plastics extrusions and panels.

mas Ltd, Greenfield Factory, Steeley e, Chorley, Lancs (Chorley 4251) Klingpressure tapes for masking and proteci first-aid outfits; p.v.c. self-adhesive res; Quilton self-adhesive p.v.c. quilting.

aney Gallay Ltd, Vulcan Works, ware Road, London NW2 (Gladstone ⁽¹⁾ Stainless steel toilet units.

mide Ltd, Carr Road, Barnoldswick, ne, Lancs (Barnoldswick 2581) P.v.c.ted non-slip floor covering for galleys flight decks; Ilonca expanded vinyl, c-coated, flameproofed and stainstant fabrics for seat armrests and heads.

waland Bedding Ltd, I Bear Gardens, idon SEI (Waterloo 6053) Scatter bions.

wty Rotol Ltd, Cheltenham Road, Micester (Gloucester 21511) Remotely trolled cargo loading winch with a.c. tric, hydraulic or manual drive; weight b; cable tension 7,000lb at up to 150ft minute pulling speed. **Dowty Seals Ltd**, Ashchurch, Glos (Tewkesbury 2441) Drylon unlubricated bearings, rollers and glide wheels for cargo loading.

Dunlop Co Ltd, The, Aviation Division, Foleshill, Coventry (Coventry 88733) Flight deck electro-thermal floor heater panels.

Dunlop Co Ltd, The, Precision Rubbers Division, Station Road, Bagworth, Leics (Bagworth 361) A wide range of products from this company includes silicone/ Terylene door seals, and Hypalon window seals; silicone sealing strips for galley flooring and access panels; baggage hold linings and panels; neoprene floor sheeting, and butyle rubber ball flush valves in toilet compartments; expanded silicone sponge for flight deck thermal insulation; Viton fireproof coatings; duct coupling hoses, rubber insulated fastening clips, and small mouldings for electrical and other fittings. Future developments will extend the uses of glass and Terylene fibres in conjunction with various rubber polymers; flock-covered rubbers will mask hot and cold spots in furnishings; wider use of silicone rubber will increase the colour range of cabin fittings to match furnishings.

EMI Electronics Ltd, Hayes, Middx (01-573 3888) EMI, L4 transistorised, battery operated portable tape voice recorder, suitable for in-flight dictation in business aircraft.

Eagle Transfers Ltd, Hermes Road, Lichfield, Staffs (Lichfield 4282) Printed notices.

Ekco Plastics Ltd, Southend-on-Sea, Essex (Southend-on-Sea 49491) Ekco Nova tableware, injection moulded in Ceram 70; virtually unbreakable, stain resistant, and available in choice of two-colour designs; stack together for space saving. Luxury-ware decorative accessories for toilet compartments.

Elliott-Automation Ltd, 34 Portland Place. London W1 (01-580 5522) Designed to meet the new ICAO specification, mandatory for airliners from January 1969, Elliott's ERB-1 dinghy pack and ERB-2 bulkheadmounting rescue beacons transmit simultaneously and automatically on both international distress frequencies on land or water. More than 500 have been ordered to date by 30 airlines. Elliott intercommunication and cabin address systems are fitted in 36 types of British civil and military aircraft. The new 70 Series solid-state communications control system, first exhibited at Farnborough in 1966, incorporates a 60W public address speaker with a voice-operated gain device designed to produce a predetermined, automatically adjusted output volume. Considerable commercial success has been achieved by the system. Mac Date Eleven 500 series and HS.125.

Elsan Ltd., 43-55 Clapham Road, London SW9 (Reliance 2801) Anodised aluminium chemical closets, with or without pump flushing, supplied from standard range or custom built; Elsan Blue and Elsan Special aircraft sanitary fluids.

English Electric Co Ltd, The, Engineering and Heating Systems Division, The Airport, PO Box 26, Luton, Beds (Luton 31441) Sierraglo electroluminescent lighting for control panels and signs; cabin and cockpit glazing of monolithic and laminated construction in Acrylic materials and windscreens of acrylic/glass composite construction.

Expanded Metal Co Ltd, The, 16 Caxton Street, London SW1 (Abbey 7766) Expanded aluminium decorative ventilating grilles, radio grilles, security cages, etc.

Field Aircraft Services Ltd, No 2 Maintenance Area, Heathrow Airport, Hounslow, Middx (Skyport 2141) Complete furnishing schemes for aircraft interiors at Aircraft Division, Wymeswold: furnishing samples library available for planning and selection of colours and layouts. Recent work: firstclass five-seater lounge units designed and manufactured for Swissair's DC-8-62 fleet and a DC-3 Pionair of Cambrian completely restyled to de luxe standard with sound proofing, double-glazing, full hot meal galley for 24-passenger capacity. Contemporary hat-racks and full p.a. system. Flight Equipment & Engineering Ltd, Asheridge Road, Chesham, Bucks (Chesham 2563) Flight Equipment's seat production includes first class, tourist class, first/tourist convertible, and crew units for all types of civil and military operator; also special pupil seats for RAF Dominie navigational trainers. Latest developments include new versions of the convertible unit, and Flitemaster high-density tourist seats for the Trident 2E which are equally suited for the other second-generation jet transports. Flight Equipment also produce cargo lashing equipment, VIP bar units, stretcher bases, catering stowages, etc.; and provide trim and upholstery, vacuum forming, and general engineering services.

Fliteform Ltd, Building 236, Northern Perimeter Road, Heathrow Airport, Hounslow, Middx (Skyport 1205) Furnishing design consultants, contractors and fitting-out specialists; curtain manufacturers; agents for Duracote glass-fibre-backed p.v.c. material for flooring, panelling and headlining; designers and manufacturers of galley, bar and catering equipment, notices, panelling partitions, latches, seats, bulkhead-mounting cots and toilets.

Flying Service Engineering & Equipment Ltd, Springfield Road, Chesham, Bucks (Chesham 4494/5) Luxury, first, tourist and economy class seats, crew seats, seat belts and fittings, floor fittings, galley equipment, notices, partitions and toilet fittings.

Formica Ltd, PO Box 2, De la Rue House, 84-86 Regent Street, London W1 (Regent 8020) Applications for Formica decorative laminates and faced hardboard include murals on cabin partitions, galley working surfaces, tables, and sanitary units and wall panelling in toilet compartments. Recently introduced is the new 62 range of modular signs and notices, available with wording or symbols to order.

Frankenstein Group Ltd, Victoria Rubber Works, Newton Heath, Manchester 10 (Failsworth 1166) Single and twin chamber lifejackets for adult passengers; child's airline lifejackets; floating survival cots for babies; airline liferafts for up to 30 passengers; emergency survival packs.

G. Q. Parachute Co Ltd, Portugal Road, Woking, Surrey (Woking 61321) Safety harness for aircrew, and for air ambulance stretchers.

Goddard & Sons Ltd, J., Nelson Street, Leicester (Leicester 29777) Plastics polish for cleaning, polishing and reconditioning of all types of moulded plastics; application and polishing cloths for Perspex; Dry Clean, packed in aerosols, is a spray-on/ brush-off stain remover for cleaning upholstery, curtains and garments,

Godden Ltd, M. H., Bouncers Lane, Prestbury, Cheltenham, Glos (Cheltenham 7202) Electro-thermal cabin floor heating panels weighing 0.15lb/sq ft.

Graviner (Colnbrook) Ltd, one of the Wilkinson Sword Group of Companies, Fire Protection Division, Poyle Mill Works, Colnbrook, Slough, Bucks (Colnbrook 3245) Type 34H hand extinguisher designed (and ARB-approved) for use in passenger cabins. Contains 2⁴/₂ b of ICI's liquefied gas BCF as extinguishing agent. Virtually non-toxic, this extinguishant is safe to use against electrical and fuel fires as well as those involving carbonaceous materials.

Hall & Sons (Bristol & London) Ltd, John, Romilly House, Petherton Road, Hengrove, Bristol 4 (Whitchurch 2162) Aircraft finishes including dopes, lacquers, enamels and varnishes.

Hardura Ltd, Durbar Mill, Hereford Road, Blackburn, Lancs (Blackburn 51411) Harduraloop ARB-approved tufted carpets: Excelta p.v.c.-foam cushioned floor covering (grade 1 for sound insulation); Hardura p.v.c. felt-backed floor covering, and coated felts; Durafoam HF weldable p.v.c. foam in various densities and thicknesses from 1/10in to $\frac{3}{2}$ in; fire-resistant carpet underlay has been supplied recently to both BAC and BOAC.



Typical crew seat manufactured by Lancefield Aircraft Components

FURNISHING AND FINISHING ...

W. Henshall & Sons (Addlestone) Ltd, Abbot Close, Oyster Lane, Byfleet, Surrey (Byfleet 42271/2/3) BEA and other leading airlines are equipped with Henshall galleys and their equipment, which includes service trolleys, meal tray boxes, bar boxes, glass boxes, cooling boxes and heated beverage and food containers; toilet units are also supplied. Currently manufacturing complete galleys and galley equipment for BEA's BAC One-Eleven Series 500 fleet, which will include the new trolley service.

Hickman (Aircraft) Ltd, North Circular Road, London NW2 (Gladstone 6262) Airlarda interlock stacking galley units, and Airlarda cabin service trolleys; lockable amenity and bar boxes; Pullman custombuilt folding cabin tables.

Hunts (Brentford) Ltd, Beecham House, Great West Road, Brentford, Middx (Isleworth 5151) Squashes and minerals in lightweight plastic bottles and split size cans.

Imperial Chemical Industries Ltd, Millbank, London SW1 (Victoria 4444) Uses for silicone rubbers from the Nobel Division Silicones Group include oxygen breathing hose and masks.

Industrial Leather Products Ltd. Gatwick House, Horley, Surrey (Horley 5353) Aerocot baby carriers; stretchers.



Trident IE bar unit by W. Henshall & Sons

International Aeradio Ltd, Aerad Printers & Publishers Division, Aeradio House, Hayes Road, Southall, Middx (01-574 2411) Specialists in the provision of all kinds of passenger amenity for galley, bar and cabin service, including literature, maps, advertising, first-aid kits and catering equipment; also cosmetics and other items for toilet compartments; agents for the supply of specially packed Aspro tablets.

Irving Air Chute of Great Britain Ltd, Icknield Way, Letchworth, Herts (Letchworth 6262) Seat belts and harness; cargosecuring harness.

Jablo Group Sales Ltd, Mill Lane, Waddon, Croydon, Surrey (Croydon 2201) Flooring materials; plastic foam carpet underlay and insulation; lightweight insulated food containers.

Kaylee Transfers Ltd, Progress Works, Long Eaton, Notts (Long Eaton 3985) Printed transfers and adhesive notices.

Kidde Co Ltd, The Walter, Belvue Road, Northolt, Middx (01-845 6611) Inflation gear for liferafts, lifejackets and escape slides; crew and passenger oxygen systems and lightweight portable oxygen sets; airborne fire detection and extinguishing systems including portable apparatus.

Lancaster Carpets Ltd, West Street, PO Box 7, Denton, Manchester (Denton 5274) ARBapproved aircraft furnishings and upholstery; hard-wearing quality tufted carpets; Vogue range, available in 12 colours and guaranteed five years; foam and felt underlay.

Lancefield Aircraft Components Ltd, 71-83 Herries Street, London W10 (Ladbroke 2951) Luxury, economy class and crew seats to specification.

Latem Co Ltd, 17 Coombe Road, New Malden, Surrey (Malden 9261) A wide range of products includes complete galley units (as installed in aircraft of BUA), stainless steel sink units and surrounds, galley container and stowages, and bar boxes; hat racks; passenger seat frames; toilet units and wash basins.

Latex Upholstery Ltd, Lonsdale Road, London W11 (Bayswater 6262) Specialists in cabin interior refurbishing, including insulation and soundproofing, and seat overhaul and upholstery; manufacturers of escape chutes, Kargo Pak cabin freight containers for fitting to unoccupied seats, and hold restraint nets; suppliers of Tenax press-stud fasteners.

Lec Refrigeration Ltd, Bognor Regis, Sussex (Bognor Regis 2201) Galley refrigerators.

Lister & Co Ltd, Manningham Mills, Bradford, Yorks (Bradford 42222) Lightweight heat and sound insulations; fabrics for upholstery and interiors.

Lockheed Precision Products Ltd, Aircraft Equipment Division, PO Box 1, Shaw Road, Speke, Liverpool 24 (Hunts Cross 2121) Various models of hydraulic seat actuators.

London Artid Plastics Ltd, Buckingham Avenue, Trading Estate, Slough, Bucks (Slough 27661) Galley containers and tableware manufactured in quantity to customers' specifications; specialities include injection moulded trays, and two-colour Melamine ware.

London Name Plate Manufacturing Co Ltd, The, Zylo Works, Brighton 7, Sussex (Brighton 67025) Notices and signs made to customers' specifications from metal and plastics in a variety of finishes.

McMurdo Instrument Co Ltd, The, Rodney Road, Fratton, Portsmouth, Hants (Portsmouth 35361) Aqualite emergency lights for lifejackets and dinghies, using wateroperated batteries.

Magnet Applications Ltd, 323 City Road, London ECI (01-837 6222) All types of permanent magnets, including Arelec range of magnetic catches and doorstops with holding powers from 6lb to 176lb, suitable for cabin and compartment doors, cupboards, drawers and table flaps; magnetic rubber in sheet, ribbon and strip form; short field magnets suitable for use near electronic equipment. Malby-Cal Ltd, 73 Carlton Hill, Brighton Sussex (Brighton 67286) Adhesive-back anodised, or two-colour printed alumini foil decorative or instruction labels. A self-adhesive Plasti-cals.

self-adhesive Plasti-cais. Mallinson Aircraft Products Ltd, Will Thames Road, Crayford, Kent (Craylo 26244) Mallite EGB (end grain ba laminate, weighing less than lib/sq ft installed in more than 30 types of a senger aircraft; applications include is panels, cargo pallets, bulkheads, galle cabinets, seats, tables and toilet compi ments; latches, locks and bulkhead atta ments are among other furnishing produc

Marshall of Cambridge (Engineering) la Aircraft Division, Airport Works, Cambrid (Cambridge 56291) Specialists in luxury teriors, with full design and workshop is litites for the manufacture of galleys special furniture to suit these installation Custom-built interiors are produced for executive One-Eleven in association of BAC and Page Airways and, as appoint Grumman Service Centre, for the execut Gulfstream. Other conversion contracts clude civil and military transport interior

Midland Aeroquipment Ltd, Park Ro Bloxwich, near Walsall, Staffs (Blox 76414) Locks and fastenings.

Mills Equipment Co Ltd, The, 25 Victo Street, Westminster, London SW1 (01-9271) Passenger seat belts in 2in v webbing, woven from nylon or Teriv yarns, with steel or light alloy clipon permanent attachment fittings. Custom for current models, of which approxima 75,000 have been sold, include BOAC, Bl and British Eagle.

Minimax Ltd, Feltham, Middx (01-890 20 Air-foam, dry chemical and CO₂ hand i extinguishers; CTC hand pump extinguishe first aid cases.

Minnesota Mining & Manufacturing Ltd, 3M House, Wigmore Street, PO I I ET, London WI (Hunter 5522) Adhesi for all types of material and surface clude Fastbond contact cement and 3M spray adhesive, and pressure sensitive tap Scotchbrite pads, rolls, discs and bra adhesive notices and markings; Safe Walk self-adhesive non-slip panels strips for floors, steps and walkways; p tective, sound insulating and non-slip face coatings; elastomeric joint seal Scotchgard fluorochemical spray-on s repeller renders fabric resistant to oil, w and beverage stains, and to dry soil; m successful treatments include BEA of safety harness and Vanguard cabin trim, and display interiors at Famborou

Naim Coated Products, a Division of Na Williamson Ltd, Lancaster (Lancaster 63) Lionide Aerowalk, ARB approved wor fabric-backed solid vinyl flooring avail from stock in self-coloured plain, or pin emboss finishes; special printed and emb sed effects also available. Synthede vi coated fireproofed fabrics are produced plain self colours with a variety of emses for upholstery, and with perform for panelling and headlining.

Nightsop Productions Ltd, 59 North Sta London SW4 (Macaulay 6162) G amenity bags, magazine holdalls, intermail bags.

Normalair-Garrett Ltd, Yeovil, Som (Ya 5222) Oxygen breathing equipment, inding emergency, automatic drop-out syst for passenger cabins; portable proteunits to meet Air Navigation (Eu Amendment) Order 1966; and minatman-mounted demand regulators.

Novatex Ltd, Heron Trading Estate, Sun Park, Luton, Beds (Luton 54153) Dis able headrest covers, pillow cases and h towels in non-woven fabric.

Nu-Swift International Ltd, Elland, Io (Elland 2852) Portable water/CO₂ or guishers for Class A fires in carbonar materials such as carpets and fabrics: powder, and CO₂ extinguishers suitable Class B (inflammable liquids) and Class (electrical) fires.

Spacemaking Seating

Dramatic improvements on high density seat design provides more passenger 'Living Space' and comfort standard than conventional designs at 34" pitch. Space problems are our problems, can we help you? A full range of aircraft furnishings also available for all aircraft, large or small, new or old.



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A new development—all stainless steel 1000 watt oven to international standard dimensions.

ot or Cold Beverage container—all inless steel. International standard nensions, Rigid and serviceable.



Rapid Water Boiler and Dispenser. 10 pints of water to boiling in 8 minutes.



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Highest standard of cuisine is imperative in leading airlines. Herman Smith meet these requirements with the finest range of galley equipment available, or we will design and manufacture galley units and ancillary equipment to your specifications. Early deliveries can be met, enquiries invited. Catalogue on request.



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culation ovens, hot food and beverage containers, hot cups, rapid water heaters, toilet water heaters, bar boxes, air larders



Self-illuminated signs by Saunders-Roe & Nuclear Enterprises Ltd

FURNISHING AND FINISHING ...

Old Bleach Linen Co Ltd, Randalstown (Randalstown 213-6) Specialists in the supply of linens, furnishings and carpets to BOAC, BEA, MEA and other international airlines.

Osram (GEC) Ltd, PO Box 17, East Lane, Wembley, Middx (Arnold 4321) Cabin lighting.

Oyler & Co Ltd, Green Street, Brimsdown, Enfield, Middx (01-804 2786) Specialists in the manufacture of loose seat covers and headrest covers of all types as supplied to the RAF and leading airlines throughout the world.

Page Engineering Co (Sunbury-on-Thames) Ltd, Page Works, Forge Lane, Green Street, Sunbury-on-Thames, Middx (Sunbury-on-Thames 4242) Illuminated push-button switches for steward-call systems.

Pains-Wessex Ltd, High Post, Salisbury, Wilts (Middle Woodford 282) Distress signals for liferafts; the new, ARB approved Handstar, two-star red signal $(5\frac{1}{2}in \times 1in)$ with an uncocked striker mechanism, fires two red signals in succession to over 150ft.

Palmer Aero Products Ltd, Penfold Street, Edgware Road, London NW8 (Paddington 8822) Aerolam laminated metal/Plasticell rigid expanded p.v.c. foam panels with Durestos, Ferobestos or ply top surface for cabin and hold floors, warranted for 7,000hr service life; current applications include BAC One-Eleven floors and ventral stair treads, and cabin flooring in the SR.N5 and N6 hovercraft. Aerolam is also applicable to non-structural panels and bulkheads.

Perfit Loose Seat Covers Ltd, 159 High Road, Tottenham, London N15 (Stamford Hill 8456) Tailored loose seat covers.

Permutit Co Ltd, The, Permutit House, Gunnersbury Avenue, Chiswick, London W4 (Chiswick 6431) Galley drinking water filters; emergency pack, sea water desalting kits.

Philips Electrical Ltd, Century House, Shaftesbury Avenue, London WC2 (Gerrard 7777) Lamps for cabin and interior lighting.

Phoenix Telephones Ltd, Grove Park, London NW9 (01-205 6595) Emergency lights for cabins and survival equipment; illuminated warning notices.

Plannair Ltd, Kingston Road, Leatherhead, Surrey (Leatherhead 5341) Cabin ventilation blowers and heaters.

Plessey Co Ltd, The, Dynamics Group, Electrical Equipment Division, Eastern Avenue West, Romford, Essex (Ilford 3040) Plessey 40VA static inverters are installed as 110/230V, 50/60 c.p.s. power supplies for up to three electric shavers; 200VA inverters are available as a.c. power supplies for teleprinters, typewriters and similar equipment in business aircraft. Cabin address loudspeakers installed in the VC10.

Polythene Drums Ltd, Colne Road, Twickenham, Middx (Twickenham Green 1242) Collapsible polythene fluid containers housed in insulated corrugated containers, and fitted with removable caps or selfventing taps, with $5/5\frac{1}{2}$ gal capacity, for bulk carriage of water or other fluids for human or animal consumption.

Porter Co (Great Britain) Ltd, H. K., Cameron Street, Hillington, Glasgow SW2 (Moss Heights 8771) Cargo hold tie-down equipment and winches. **Priestleys Studios Ltd,** Commercial Road, Gloucester (Gloucester 22281) Specialists in screen printing on decorative panel and partition surfaces, and for instruction labels; contractors to BAC and BXL.

R.F.D. Co Ltd, Godalming, Surrey (Godalming 1441) Pneumatically inflated escape slides developed in conjunction with Walter Kidde; inflatable life jackets and liferafts.

R. H. Nameplates Ltd. Easton Lane, Winchester, Hants (Winchester 61707) Metalphoto panel and nameplate service offers rapid production (usually five days), design, precision machining, colour or black and white, and one-off or short runs. Distributors of Metalphoto-sensitised anodised aluminium.

Racasan Ltd, Ellesmere Port, Ches (Ellesmere Port 2002) Lightweight self-sanitating chemical closets; Racasan sanitary fluid.

Radford (Sales) Ltd, Harold, 122-124 King Street, Hammersmith, London W6 (Riverside 8831) Manufacturers of advanced aircraft passenger seating, hovercraft seating and stockists for Microcell seating spares. Designers and manufacturers of passenger aircraft equipment and aircraft interiors.

Reditune Ltd, Cray Avenue, Orpington, Kent (Orpington 32121) Lightweight TP18A, continuous playing taped music reproducer with remote control, for connection into the passenger address system to relay taped programmes.

Renamel (A.I.D.) Ltd, 10 Kilburn High Road, London NW6 (01-624 9194) Notices and signs in acrylics or polyester, with plain or self-adhesive backs.

Riding Hall Carpets Ltd, Riding Hall Mills, Halifax, Yorks (Halifax 65722) Airweight (39-410z/sq yd) Buccaneer carpets in 80% Evlan/20% nylon; available fireproofed in 17 colours.

Robinson Ltd, E. S. & A., 1 Redcliffe Street, Bristol 1 (Bristol 294294) Air sickness bags.

Rotaflex (Great Britain) Ltd, Rotaflex House, City Road, London EC1 (Clerkenwell 8371) Sole agents for Polyplastex United materials: Panflor decorative flooring vinyls with anti-Skydrol finish; Panlam flexible, semi-flexible, rigid and vacuumformable decorative laminates for panelling and wall trim, partitioning, blinds, galley surfaces, and seat trim.

Rotax Ltd, Willesden Junction, London NW10 (Elgar 7777) Cabin lighting equipment.

Rothmans of Pall Mall Ltd, Berk House, 8 Baker Street, London W1 (Welbeck 4467) Airline promotional material, including bar tariffs and magazine covers.

L. A. Rumbold Ltd, Albion Works, Old Oak Common Lane, Willesden Junction, London NW10 (01-965 4802) Wide experience in the design and production of aircraft seating and interiors. Since introducing the Slimline seat, substantial overseas orders have been won, Rumbold seating now featuring in aircraft of eleven major operators. These include the BAC One-Eleven, VC10, Boeing 707 and Fokker F.27 Friendship. Specially designed double units were produced for the Concorde mock-up and the company's custom-built, luxury seating appears in the Handley Page Jetstream. Rumbold seating provides a high comfort standard plus increased leg t Great flexibility in design has been ad through a policy of basic standardiu enabling customers' adjustments to be more quickly and at lower cost.

Saunders-Roe & Nuclear Enterprises North Hyde Road, Hayes, Middx (1) 3800) Betalight self-powered illum exit signs in acrylic plastic and epoy a with white lettering on a red backgo no connections or maintenance are red and service life is at least five 1 installed in aircraft of BEA, Ame Airlines, Braniff, Mohawk and several operators; alternative lettering supple order.

Saunders Valve Co Ltd. Aircraft Did Widemarsh Common, Hereford (Hei 3125) Control valves for galley and systems; automatic-closing urn taps for and cold beverages—easily dismanted sterilising; wash basin taps. Master of valves for toilet systems.

Schermuly Ltd, Spra Works, New Dorking, Surrey (Newdigate 331) Pyron distress signals for survival packs in two-star red signal, day and night com smoke/flare signal, lin and lin pistols and cartridges, Icarus range of signal rockets, and Miniflare signal miniature plastic packs complete with jector and eight waterproof cartridges. Scottish Aviation Ltd, Prestwick Ar Ayrshire (Prestwick 79888) Airline luxury executive interior schemes fon important part of the SALchek se which is backed by advice from expen design staff to assist customers in the d of furnishings and colours; supp workshop facilities include furnishing fabrics, glass-fibre, sheet metal and par Recent contracts have included the furbishing of two Viscounts for B Midland Airways, and design and iss tion of a convertible passenger/fra interior for three Aer Lingus Viscount the latter, normal passenger layout readily be converted to an all-freight h or part-freight/part-passenger configm

Scottish Aviation also manufacture McEwan seat lock, of which several di models are in production and in variants for several seat units manufact by Rumbold Ltd. Selectus Ltd, Biddulph, Stoke-on-I Staffs (Biddulph 3316) Manufacture the Velcro Bri-Nylon touch-and

the Velcro Bri-Nylon touch-and fastener. This ingenious Swiss invention be among the most significant of a developments in interior furnishing, aircraft specialists have not been so appreciate its qualities. Once the two (available in four standard widths, a choice of 17 shades) have been stapled, tacked or glued to their rep surfaces to be joined, there is no app limit to the successive number of fast and removal operations that are possible Store.

Shaw (Dorai Replicas) Ltd, The 42 South Street, Reading, Berks (Ra 54821) Lockable galley and bar comb for dutiable and bonded goods.

Short Brothers & Harland Ltd, PO Ber Queen's Island, Belfast 3 (Belfast S Continue to produce lightweight sea their General Engineering Division, townards, County Down. Main struct

Interior of Viscount refurnished for British Midland Airways by Scottish Aviation Ltd



ers of these seats are manufactured in EGB laminate which has high energy tion characteristics. Currently in proare single-seat units (20lb weight) double-seat units (30lb weight) for ms. Similar models can easily be d to suit a variety of other aircraft. the developments are available with backs to meet larger airline require-These seats use the same construcmethod and are built at comparable s. Prototypes of seats meeting Boeing and Concorde economy-class requireare now being developed and will be available for demonstration. Ultranight tubular "folding in situ" seats, ped for Skyvans with quick-conversion ter/passenger requirements, are now in with Northern Consolidated Airlines re being developed to suit other

Gorman & Co Ltd, Davis Road, ngton, Surrey (01-397 6171) ARB red, the Stelox half-hour, selfned portable emergency oxygen ing apparatus exceeds the mandatory ment for pressurised public transport t by more than 100%; the 85-litre ty chest pack and mask weigh 104lb. ne webbing seat belts are produced in s colours, and with alternative attachittings to suit customers' requirements.

Gliss Ltd, Star Lane, Westwood rial Estate. Margate, Kent (Thanet Several international airlines have Silent Gliss extruded aluminium curtain rails, available in a variety of as with white nylon gliders.

Ltd, Herman, Aerospace Division, g 247D, Elgin Crescent, Heathrow t, Hounslow, Middx (Skyport 8220) rescale manufacturer of galley equip-Herman Smith markets a complete of ovens, rapid water boilers, urns, upboards and beverage containers. developments are designed to achieve strength and reliability in portable Notable export achievements during ncluded ovens and beverage containers i foreign airlines, and to Sud-Aviation bougas Aircraft. Toilet water heaters oduced as standard equipment in all and One-Elevens. Other products small rubber-bladed bulkhead fans.

Industries Ltd, Aviation Division, House, Wembley Park Drive, ley, Middx (Wembley 8888) Cabin nents.

bom & Rieck Ltd, Jaxa Works, 91-95 me Road, Hainault, Ilford, Essex 0251) VC10 toilet seats are in coated with Jaxapol white polyester giving greater resistance to cracking reakage than plastic seats. Jaxa shellac is used as a priming coat on many

m Design Engineers Ltd, Sarisbury tes. Sarisbury Green, Southampton, (04-895 3696) Stress engineers and ers to the aircraft, aircraft furnishing lied industries. The company's stress, and value engineering team is made individuals with wide aerospace ence, drawn mainly from the Folland team.

x Ltd, Nightingale Road, London W7 (6711) Plastics moulding of flat or the meal trays in Perspex and other als; windows and panels.

& Co Ltd, E. F., 154 Bromsgrove Birmingham 5 (Midland 0959) Loose overs, antimacassars and pillow cases : re-upholstery ; asbestos seals and its; sub-contractors for any type of r trim.

(Aircraft) Ltd, Beckley Hill Works, Higham, Rochester, Kent (Shorne Retractable passenger steps.

Safety Glass Industries Ltd. Suntex Thorney Lane, Iver, Bucks (Uxbridge Laminated safety glass; thermomouldings.

(Metal Workers) Ltd. C. F., Molly ¹⁷ Lane, Wokingham, Berks (Woking-¹⁵ Lone of the leading UK manufacturers of galley and bar units, C. F. Taylor has designed and manufactured galleys for many current British transport aircraft including VC10s and Super VC10s, and half the number of BAC One-Elevens on order; also incorporated in the latter type are the buffet units for the American Airlines version. Another Taylor (Metal Workers) product is the stainless steel toilet, current versions of which number eight different models; the heaviest type weighs 144lb uncharged, and examples are fitted in the Herald, HS.125 and Beagle Basset.

Taylor (Plastics) Ltd, C. F., Church Road, Crowthorne, Berks (Crowthorne 2277) Glass reinforced plastic mouldings with built-in textured finish.

Tea Service Equipment Ltd, 102-108 Kirkdale, Sydenham, London SE26 (Forest Hill 0558) Stainless steel folding trolleys for cabin bar and meal service; electrically heated beverage and food containers.

Teddington Aircraft Controls Ltd, Cefn Coed, near Merthyr Tydfil, Glam (Merthyr Tydfil 3261) Four-inch toilet servicing shutoff gate valve, designed for 4,000hr minimum service life.

Teleflex Products Ltd, Christopher Martin Road, Basildon, Essex (Basildon 22861) The Concorde aircrew seat, stressed to 9g, features electro-mechanical elevation and tracking, 30° hydraulically locked recline, and adjustable armrests each with a built-in ashtray; installed weight is 42lb complete with integral inertia harness and life jacket stowage. The new Teleflex luxury modular crew seat, designed for light/medium transports, uses a novel, lightweight high strength structural material. This seat, which has been ordered by Fokker for the F.28, is mounted on a pedestal base, and is fitted with three-point inertia reel harness and adjustable armrests. A folding, supernumerary aircrew seat with integral safety harness has been developed.

Templeton & Co Ltd, James, 62 Templeton Street, Glasgow SE (Bridgeton 1860) Carpets.

Tensator Ltd, *Tickford Street, Newport Pagnell, Bucks (Newport Pagnell 4)* Constant-force springs for counterbalancing door and hatch mechanisms, emergency equipment stowages, window blinds, seat mechanisms and inertia harness; applications include the VC10, One-Eleven and Concorde.

Thermotank Ltd, 150 Helen Street, Glasgow SW1 (Govan 2444) Since 1947, Thermotank have supplied more than 100,000 punkah louvres for all types of aircraft. Current products include seven types of plastics punkah louvre, one new all-aluminium type, and passenger service panels with integral lighting through the louvre.

Thorn Special Products Ltd, Great Cambridge Road, Enfield, Middx (Howard 2477) All types of interior lighting fittings, including passenger reading, adjustable reading, bulkhead, dome and step lights; and electroluminescent cabin warning signs.

Tibor Ltd, Clifford Mill, Stratford on Avon, Warwicks (Stratford on Avon 2233) Coinciding with the firm's coming-of-age, Tibor has secured the contract for carpets, curtains and upholstery fabrics for the Concorde mock-up. This was achieved last autumn to the specification of Charles Butler, at very short notice, and in the face of fierce American competition. Tibor has, in more than ten years' association with BAC and Hawker Siddeley (and with their predecessors), produced fabrics to a number of special designs for several British and foreign airlines, and for executive interiors in HS.125s.

Ultra Electronics Ltd, Western Avenue, London W3 (01-992 3434) SR.N4 is fitted with a UEL transistorised, push-button communication control and p.a. system, which accommodates high fidelity music reproduction as well as speech; similar UA.60 series equipment is installed in the Belfast, C-130K and the VC10. UEL powerplant control and air intake control systems are installed in the Concorde.

Velmar Textiles Ltd, Greenhill Mills, Grange Road, Batley, Yorks (Batley 1900)



Cabin waste-disposal bin by WCB Containers Ltd, as used by BEA

Carpets: a standard range of colours is available in two qualities, designed for hard wear under short-haul conditions; special cabin schemes can be matched.

Venner Accumulators Ltd, Kingston By-Pass, New Malden, Surrey (01-942 2442) Emergency lighting batteries.

"W" Ribbons Ltd, 12 Commerce Way, Purley Way, Croydon, Surrey (Municipal 1197) Nylon and Terylene webbing tiedown harness.

WCB Containers Ltd, Bayley Street, Stalybridge, Ches (061-330 5576) Polythene bins, powder-moulded to any shape or size for food boxes, cabin waste disposal, laundry boxes, storage.

Walpamur Co Ltd, The, Industrial Division, Walpamur Works, Darwen, Lancs (Darwen 72661) Crown industrial finishes for all articles painted to a specification. Retaflam fire-retardant decorative paint; Crown gloss and Crown emulsion paints containing IFCA (insect and fly control agent).

Walter's Electrical Manufacturing Co Ltd, 249-251 Kensal Road, London W10 (Ladbroke 2323) Reading lights, passenger service panels, illuminated warning notices.

Ward Brooke & Co Ltd, Fassetts Road, Loudwater, Bucks (High Wycombe 26233) Design and consultancy service for incorporation of plastics materials in interior furnishing schemes; lighting fittings—lampholders and fluorescent tube holders; notices and signs in plastics, and hot foil stamping; panelling and trim work to customers' specifications; seat controls, fittings and accessories moulded in plastics, also louvres and air nozzles, window surrounds.

Warne & Co Ltd, William, Barking, Essex (01-594 3800) Special CO_2 hose for fire extinguishers; licence agreement with R. E. Darling Co to handle Darling Redar range of airborne oxygen breathing hose and apparatus; plastics and rubber trim sections, extrusions, lining, soundproofing and antivibration mountings designed and manufactured to customers' specifications; toilet effluent hoses in reinforced natural rubber, and in synthetic rubber compounds; all types of ventilation ducting.

Weathershields Ltd, 147-169 Bishop Street, Birmingham 5 (Midland 5876) Seat components, cushions and upholstery.

Westhill Furnishings (Halifax) Ltd, Westhill Mills, Hanover Street, Mossley, Lancs (Mossley 2325) Contract manufacturers of seats, and seat upholstery and furnishings.

Wilmot Breeden Ltd, 13 Oxford Street, Birmingham 5 (Midland 7272) Door locks, handles, ashtrays, fittings, etc.

Wilmot Packaging Ltd, Salisbury Road, Totton, Southampton (Totton 3621) Specially designed containers for air cargo.

Wokingham Plastics Ltd, Fishponds Road, Eastheath Industrial Estate, Wokingham, Berks (Wokingham 2271) Mouldings in Perspex, p.v.c., etc.; tableware, toilet fittings, cabin windows.

132

FLIGHT International, 25 January

SPOR

USINES

AN



The 10,000th Cessna 150 has been supplied to the Longhorn Aero Club of Austin, Texas claimed to be the world's largest, with 2,300 members and 140 aircraft operated by 18 chapters in Texas and neighbouring states. Cessna 150s are again in full production, at ten per day, from the factory at Strother, Ka. Production of the type began in 1958 and reached a peak of over 3,000 in 1966

Jetstream Test Progress Handley Page's decision to base Jetstream testing at Pau, southern France, for the winter is certainly paying dividends in hours flown and work completed. *Flight* staff writer Neil Harrison recently visited the team at the Pau Long Pont airfield and talked to Mr Graham Moreau, test pilot and *chef d'équipage*, and Mr John Coller, flight test manager. Flying hours on the first prototype—now fitted with the definitive Turbomeca Astazou XIV engine and Hamilton Standard hydraulically controlled propeller—were, they said, now accumulating at nearly twice the expected rate. The first prototype had logged over 70hr (including about 27hr on the Astazou XIIs originally installed) and was making one or two flights a day, totalling over two hours, seven days a week. Serviceability of the aircraft and the test equipment was unusually good.

Reasons for basing at Pau were balanced in the order of 60 per cent because of better weather and 40 per cent because of proximity to Turbomeca. Nearly all flying to date has concerned engineering and systems development; and, though the aircraft has not undergone free-air stalling trials (the antispin chute has been streamed on test), the estimated low-speed lift seems to be there, and the minimum control speed targets look like being achieved. The Jetstream 001 is being regularly flown to a gross weight of 14,000lb—the highest so far publicly revealed for developed versions. In fact, during an air-to-air photographic session over the Pyrenees in formation with a Pilatus Porter, the Jetstream was able to maintain station at 100kt at 10,000ft with take-off flap set and a gross weight of over 13,000lb.

Once the handling-trials aircraft joins the test team at Pau and the minimum control and stalling speeds and position-error checks have been made, the Jetstream should accelerate rapidly through the C of A check flying programme. The company

With a new colour scheme for the civil deliveries at long last expected to begin: the Hughes 500 five-seat turbine light helicopter. Civil production has awaited completion of deliveries to the Army; the OH-&A Cayuse is now in service in Vietnam. The civil prototype seen here (handling impressions, "Flight," December 29, 1966) has just returned from a tour of South America, where near-full payloads were lifted from the 13,400ft-altitude airfield at La Paz, Balivia, and the Andes were crossed at 16,000ft. Autorotational touchdowns were demonstrated at 10,000ft



keeps between 30 and 40 engineers at Pau at any one time, they are installed in a part of the new terminal of the airport. Certification of the Jetstream is still expected by summer.

Dassault Hirondelle At the Paris Show last year Dass showed the model of a 14-seat twin turboprop light transp business aircraft known as the MD-320 and looking very n like a Handley Page Jetstream. With a strong chance obtaining a French Air Force order for the replacement some of the large number of piston-engined MD-315 Flam Dassault has decided to go ahead and build a prototype of MD-320.

To be called Hirondelle, the new aircraft is an all-fu aircraft in its major equipment systems and structure, a powered by two Turbomeca Astazou XIVs driving & Figeac propellers. The prototype is under construction Bordeaux-Merignac and, coming from the same stable as Fan Jet Falcon, is clearly a strong runner. Gross weigh 12,000lb, and the equipped empty weight is estimated the 6,400lb. The cabin is 20.3ft long, 5.5ft high at the centre has a volume of 410 cu ft. Seating capacity is for up to passengers, and the large door is designed to be big enough an Astazou powerplant to be loaded.

Pipers in Ireland will in future be supplied by Balt Aviation Ltd, whom CSE Aviation have appointed sales a for the Republic and Northern Ireland. Formed for purpose by Wicklow farmers Mr David Philips and his Tim, Ballyfree Aviation will operate from the private an at Ballyfree Farms, Glenealy, Co Wicklow. Ballyfree was venue for the first Rothman's International Air Rally and Race in Ireland last June, to be repeated this year on June

MPM Flying Group After ten years of flying from Est the MPM Flying Group has moved its base to Wycombe Park. Here the group's newly rebuilt 32-year-old Aerona (G-AETS is reportedly performing "just like new." Renow work is almost complete on the Currie Wot G-APWT. Mr Mills, group secretary (68 Kennedy Road, London W7), w be glad to hear from PPL holders genuinely interested in f vintage and ultra-light aircraft, as the group has a few men ship vacancies.

SIAT Flamingoes for Switzerland Swissair, which ope the Swiss Air Transport School on behalf of the Swiss Go ment, has ordered ten new SIAT 223 Flamingo trainers West Germany's Siebelwerke ATG, to replace the a Bücker biplanes at present in use at the School. Three a be of the fully aerobatic 223K type and the remaining s the normal 223N version with limited aerobatic qualities ten will be equipped with silencers, as a contribution to very active anti-noise campaign now being waged in Swi land. The Flamingo is a four-seat cabin monoplane Lycoming IO-360 engine and made its first flight in M 1967. Swissair took over one of the four prototypes last sur for evaluation purposes.

INDUSTRY International

Products Company News

and Simulators The Ministry of hnology has placed an order valued approximately £3.5 million with ifon Air Trainers Ltd, Aylesbury, ks, for three Nimrod aircraft simur complexes. This results from an al order for a single unit placed in -1967. Redifon is the prime contor and project manager, with Elliottomation acting as major sub-contor. In fact the Elliott contribution tes up some £2.4 million of the new er-comprising three Elliott 4130 hal computers for each simulator.

ach simulator represents two secs, one reproducing the flight charactics and flight decks and the other oducing the crew stations for navion, search and armament systems. h flight deck will be provided with Aylesbury-built colour visual attach-

rod Crew Seats Teleflex Products Christopher Martin Road, Basildon, ex, has received an order worth some 000 for supernumerary crew seats, plete with four-point inertia reel ty harness, for the Hawker Siddeley rod. This follows the original 000 order to Teleflex for Nimrod t and co-pilot seats.

Navigation Simulators Hawker eley Dynamics have received an r worth more than three-quarters of illion pounds from the Ministry of mology for three navigation simucomplexes. Two are for the Royal Force and will simulate the first gator's position in the Dominie gation trainer. The third, for the

ch orders for navigation simulators Hawker Siddeley Dynamics are red above. This is a typical training for the Dominie



This aero-engine transit and storage container is the latest in the range of re-usable covers made by R. A. Brand & Co Ltd, of Letchworth, Herts. Named Texicoon T603, it utilises p.v.c. sheet specially developed by Bernard Wardle (Everflex) Ltd and offering exceptionally low water permeability rates and high weld and tear strength



Royal Navy, will simulate instrumentation on helicopters, the Phantom, the Buccaneer and the Sea Prince, in addition to radar simulation.

The RAF systems will have ten and five training cubicles respectively and the RN version six. Each complex will be controlled by an Elliott 4130 computer.

LTV's NASA Contract The National Aeronautics and Space Administration has exercised the second of three oneyear renewal options with the Range Systems Division of Ling-Temco-Vought to provide computer services for the major contractors operating at the NASA-Michoud Assembly Facility, New Orleans.

The new \$2,704,349 (£1.1 million) extension of Ling-Temco-Vought's basic cost-plus-award-fee contract was awarded by Michoud's parent organisation, the Marshall Space Flight Centre near Huntsville, Ala.

The services include operation and maintenance of a large complex of digital and analogue computers, data transmission systems, data reduction systems and related electronic equipment. Michoud is the assembly site of the uprated Saturn I and Saturn V first stages, designed for use in the Apollo manned lunar landing programme.

Container Discount An IATA size 9 container, known as "Containair," manufactured and sold by Cargo Packers Inc, of New York, is claimed to be the only container in its category providing both international and US domestic discounts to shippers. It can be used equally well on aircraft, trains, ships and lorries.

"Containair" holds up to 2,000lb of freight, and this size of container accommodates some 90 per cent of air freight shipments sent today. It is claimed to be more economical and efficient than the conventional type generally favoured by the air cargo industry. "Containair" provides air freight shippers with up to £7 10s discount on overseas shipments, and sells for less than £10 per unit; the manufacturer suggests it be used for 15 to 18 trips. Further details from Graff International, 116 High Holborn, London WC1.

IN BRIEF

The Aviation Division of Smiths Industries has received a £75,000 order for equipment and instruments, through Jugoimport, for Preduzece Soko, Yugoslavia.

Dunlop has acquired the whole of the ordinary share capital of **RE Components Ltd** of Sapcote, Leicester. The company manufactures a wide range of specialised rubber components for the aircraft, electrical and mechanical engineering industries.

Aviation Power Supply Inc, Burbank, California, has purchased **RWS Electrical Accessory Service Inc,** Burbank. RWS will become a division of Aviation Power Supply and Mr Hal W. Weygandt Jr, president of the acquired firm, will join APS as vice-president in charge of the RWS Accessory division.

A new and extensive range of a.c. and d.c. solenoids designed specifically by Magnet-Schultz of Memmingen (MSM) to meet increasingly sophisticated needs in remote control and operation of hydraulic valves is now available from the **Rodene Solenoid Co**, Spring Grove Works, 579 London Road, Isleworth, Middx.

Spaceflight

SPACE EXPENDITURE REDUCTION?

So far, the Government in its economy drive has not decreed any cuts in UK space expenditure, but it is quite likely to take a hard look in the near future at the Mintech budget and some projects might be shorn of funds.

At present, Britain is spending something over £30 million a year all told on international and national space programmes. Just under half that total goes on the former (ELDO, ESRO and Intelsat) and just over half on the latter, which includes both civil and military activities.

The Parliamentary Estimates Committee, whose report on *Space Research and Development* (published in July last year) has yet to be debated in the Commons, suggested that these proportions were right—more should be spent on national than on international programmes—and recommended that a firm budget should be laid down for the next five years. It did not dissent from the view of the National Industrial Space Committee that annual expenditure on space should be between £30 million and £35 million.

Subsequently, the British Interplanetary Society, in its Space Policy for Britain proposals (published in Flight for January 11, pages 65-66) has suggested that the United Kingdom should contribute about 25 per cent annually to a European Space Agency budget of £80-£100 million and should have a national space budget of £20-£25 million p.a., excluding contributions to ELDO, ESRO and CETS.

The whole of Britain's international space expenditure is committed by inter-Governmental agreements to organisations like ELDO, ESRO and Intelsat, and therefore is not reducible except by re-negotiation. The UK contribution to ELDO at present comes to just over $\pounds9\frac{1}{2}$ million a year, which is more than twice as much as total annual UK expenditures on ESRO and Intelsat, respectively something over $\pounds4$ million and $\pounds600,000$. (These figures are derived from last year's Parliamentary Estimates Committee report, the ELDO total taking into account the Organisation's repayments for work done, and facilities provided, in the United Kingdom.)

As far as ESRO is concerned, there is a considerable financial return to the UK in terms of contracts placed by the Organisation; and the Intelsat agreement, to which Britain is party, comes up for re-negotiation on a permanent basis next year.

In national space expenditure, too, Britain is involved with inter-Governmental arrangements like that with the United

States on the Skynet military communications system. The major British space project, Black Arrow, is currently funder at about £3 million a year and a cut of this order would hardly be likely to interest a Government concerned will savings of several hundred millions.

CO-ORDINATING LUNAR EXPLORATION

Setting-up of an Apollo Lunar Exploration Office with National Aeronautics and Space Administration headquare was announced recently by NASA Administrator Mr James Webb. Objective of the ALEO is to co-ordinate US Ma exploration, the idea behind this co-ordination being to increthe effectiveness of direction of Apollo programme im exploration beyond the initial landing. The new unit will part of the Apollo Program Office of the Office of Mana Space Flight (OMSF) but will be staffed by personnel for both OMSF and the Office of Space Science and Application (OSSA).

The initial programme of lunar exploration with unmann spacecraft has concluded in OSSA with this month's success last Surveyor flight. The new office, directed by Captain Lee Scherer, USN (Ret), who has been Assistant Director for Lun Programs in OSSA and is transferring to the Office of Mann Space Flight, will bring together OSSA experience in scient lunar exploration with Apollo mission management respon bility in OMSF.

SOVIET TEN-MAN SPACECRAFT?

A prediction that the USSR might send spacecraft carrying to ten men each to Mars and Venus in the near future a made recently by Scientist-cosmonaut Konstantin Feokist who in October 1964 flew in the first multi-manned spacen with Col Vladimir Komarov and Doctor-cosmonaut Ba Yegorov (Flight, October 15, 22 and 29, 1964). A spacer design engineer, Feoktistov also predicted—in an interiwith a correspondent from the monthly magazine Aviati Kosmonavtika (Aviation and Cosmonautics)—the possibility nuclear powerplants being used for future Soviet mam spaceflights to Mars and Venus.

Other points made by Feoktistov in the interview were is manned Soviet lunar exploration spacecraft would probe operate on chemical fuels, such as an oxygen-hydrogen mixin —a combination also selected for the upper stages

Apollo spacecraft for first manned Earth orbital flight (left) being hoisted into position for final systems check-out at North American Rockwell Corp, Downey, Calif. Below, the three astronauts who will fly in it—left to right Walter Cunningham, Don Eisele, Walter Schirra (commander)





picture had the appearance of a ern movie scene strewn with rocks, of them one foot (304 mm) across," a United Press International message the Jet Propulsion Laboratory, Pasa-Calif, describing the Surveyor 7 photographs and perhaps referring e one reproduced here, which shows fragments in the rough highlands the rim of the Crater Tycho

rica's Saturn vehicles. Huge Soviet Earth-orbiting laboras should have at least two air locks, he suggested, for pe in the event of puncturing by meteorites; and these al "labs" should carry small "space lifeboats" with tal re-entry systems, in case the mother ship ran into an overable situation.

is interview, printed in advance in the daily newspaper *itskaya Litvia*, published in Vilnius, the Lithuanian capital, hed Moscow just as the Tass news agency put out a ment from another Soviet cosmonaut, Pavel Popovich, his recent studies at the Air Force Academy in Moscow at that "we are getting down to our main business aration for new space flights. I believe that the knowledge have gained in the academy," he added, "will be of the ost value in our work." Popovich had recently graduated fellow-cosmonauts Andrian Nikolayev, Valeri Bykovsky, Belyayev and Alexei Leonov. For their diplomas, the mauts had produced theses devoted to various aviation spaceflight problems.

SMOS 199 LAUNCHING

anuary 16 the first Cosmos satellite to be launched by the ^{et} Union in 1968, Cosmos 199, was put into Earth orbit the following parameters:—

hal period of revolution, 90.2min; apogee, 386km (approx 240); perigee, 204km (1261 miles); inclination of orbit, 65.7°.

nouncing this launching, Tass said that "scientific equipon board the satellite for research in outer space, under programme announced in March 1962, is functioning nally."

NOEUVRABLE SOVIET SATELLITE

rding to a West German space expert, Russian scientists have at their disposal a fully manœuvrable satellite which be used for manned flights to the Moon. Herr Harro ner, head of the space division of West Berlin's Wilhelmster Observatory, said he had identified Cosmos 198, hed on December 27 last year (*Flight*, January 11), as of such a completely new and fully dirigible type.

^{said} that the Russians launched the satellite on Decem-⁷ into a circular orbit about 280km (174 miles) above the ^{ce} of the Earth; then on the next day Cosmos 198, directed by radio signals from the ground, re-ignited its rocket motors and moved into a much higher circular orbit, 925km (580 miles) above Earth.

Herr Zimmer commented that such a manœuvre had never before been achieved by an unmanned satellite, either American or Russian; he thought it highly probable that the Russians had designed this ground-controlled and fully dirigible satellite for use on manned spaceflights to the Moon.

USSR-FRENCH LAUNCH PROJECT

The Soviet Union and France believe that co-operation between them in the exploration of outer space has entered the stage of practical implementation of joint projects, according to a Moscow announcement of January 12. A communiqué on the second session of the Soviet-French standing commission (*Flight*, January 18, page 101), signed in Moscow on January 11, states that one of the immediate tasks is to formulate practical aims in space communications.

This communiqué, as given in a Novosti Press Agency report, "notes the successful development of co-operation, which covers space research, space meteorology and communication via artificial Earth satellites, including television transmissions. Work is now under way to build a French artificial satellite, which will be launched with the help of a Soviet carrier rocket."

This session of the commission, which opened on January 8, was directed by the co-chairmen, M Michel Debré, French Minister of Economy and Finance, and Mr Vladimir Kirillin, deputy chairman of the USSR Council of Ministers.

AIRBORNE AURORAE STUDY

Described as "the most comprehensive study made on aurora," two extended periods of observation of the aurora borealis are being carried out by NASA from four different levels ground, aircraft, sounding rockets and satellite. The first period started last Thursday, January 18, with a series of flights by a specially equipped Convair 990 (normally based at NASA's Ames Research Centre, Mountain View, Calif) over a wide area of the north, from Churchill Research Range, Fort Churchill, Canada. The aircraft, which will fly in the Fort Churchill area as well as across country to Fairbanks, Alaska, and Thule, Greenland, carries a variety of experimental equipment—spectrometers, photometers, wide-angle cameras and



Test firing of the ONERA (Office National d'Etudes et de Recherches Aerospatiales) LEX hybrid rocket prototype. Its name derives from Lithergol Experimental and it has been designed to test this kind of propulsion

Spaceflight

radio-frequency receivers. Several of the flights will study time and space variations of auroræ and Polar Cap airglow.

The first period of flights will end on February 8 and the second will run from February 21 to March 12. Three flights in each period will be co-ordinated with sounding-rocket launches from the Churchill Range, and many of them will be coordinated with passes by the orbiting geophysical observatory satellite OGO 4, which includes 12 experiments now engaged in studies of auroral and Polar Cap phenomena.

NASA says that "although auroræ have been scientifically observed for the past 200 years, there is still no clear understanding of their cause. The [1968 Airborne Auroral Expedition] project is the most comprehensive study made on auroræ. The expedition will give scientists an opportunity to observe from four different levels—ground, aircraft, sounding rockets, and the satellite flying above 250 miles. They hope to find causes, possibly physical and chemical changes, which may fit in with many theories and other observations made, especially those of the past 20 years."

The sounding rocket contribution to this study has been made by five Canadian-manufactured Black Brants, which were being fired from Fort Churchill over a ten-day period which began on January 16.

WORLD SPACE CONFERENCE

Under United Nations' auspices a Global Space Confete is being held in Vienna next August (14-27) and a panel representatives from 13 countries has been meeting in N York to plan it. Already abstracts of 222 scientific papers in been submitted for consideration, and one of the panel's ta is to decide how papers are to be selected, published a delivered at the conference. Main theme of discussions is be the practical benefits from space research and exploration and the extent to which non-space countries can profit for such achievements. The 13 nations represented on the planm panel are Australia, Brazil, Bulgaria, Czechoslovakia, Frau India, Italy, Japan, Rumania, the Soviet Union, Sweden, Unit Arab Republic and the United States.

IAF OCTOBER CONGRESS

In New York next October (13-19) the Internation Astronautical Federation is holding its 19th Internation Astronautical Congress, which will consist of 20 special sessions and eight theme sessions, with a maximum of papers per session. The specialist sessions, consisting of conbuted papers, will focus on recent achievements in the faof astrodynamics, propulsion, astrionics, bioastronaut re-entry physics, systems design and education. The the sessions, made up of invited papers, will be on the gene subject of Organising Space Activities for World Needs.

The IAF is an association of 54 member societies in countries. Its annual congress brings together specialists in branches of space activity, from all parts of the world, present a paper, it is not necessary to be affiliated to one of federation's member societies, or to be sponsored by sud society. Papers put forward are examined by the program committee and are judged solely on their suitability inclusion. Only original work will be considered.

Anyone wishing to contribute a paper to the special sessions should submit an abstract of 500-1,000 words, triplicate. This should give the title of the paper, full name address of the author and his affiliation, plus an indication the session for which the paper is proposed. Inclusion sketches of major figures will help in evaluating it.

Abstracts should be sent to Miss Mireille Gérard, Ameri Institute of Aeronautics and Astronautics, 1290 Avenue the Americas, New York, NY 10019, USA, and must posted early enough to reach New York by April 1. Auth may expect to hear from the programme committee by ab June 1.

GEOS-B Launched The second geodetic Earth-orbit satellite, GEOS-B (described in *Flight* for January 18, A 101), was successfully launched from Vandenberg AFB, G on January 11 at 1616hr GMT by DSV-3E Improved De rocket booster.

Space Physics Summer School Organised by the Univer of Toulouse and CNES (Centre National d'Etudes Spatial a Summer School on Space Physics, held every two year, taking place this year at l'Ecole Nationale d'Ingenieurs, Tah Hautes-Pyrénées, from August 2 to September 7. Requ for admission (which must be in before March 15), and I details of the curriculum and accommodation arrangene may be obtained from Centre National d'Etudes Spatia Division des Relations Universitaires, 129 Rue de l'Univers Paris 7.

Space Medicine Encyclopædia A reference work specialists engaged in the medical aspects of spaceflight been published in the Soviet Union, according to a Mos announcement. Called the Concise Manual on Space Biol and Medicine, the book includes over 2,000 terms used in the fields and also numerous terms employed in allied branches knowledge, such as technical sciences, physics, chemin mathematics and electronics. Major contributions are made 23 authors, outlining achievements in space biology, medic and psychology.



DEFENCE CUTS: THE IMPLICATIONS

RE IS NO DOUBT whatever that the cellation of the entire F-111K force resents a grave loss, not only to British power but to Britain as a whole. spective of any number of Governnt statements, there is no other aerone available to Britain which has where near the performance of the 11. Two important operational and ustrial considerations immediately

e as a result of the cancellation. perationally, the establishment of 50 11Ks was to have represented the element of the RAF's striking force n the date of their delivery beginning January 1970. Their main function long-range strike and reconnaissance, ch role they were to take over from V-bombers and Canberras. The latter raft have a particularly important mitment to NATO: that of longe reconnaissance, which they share the USAF RB-66 force. The Cana cannot be retained indefinitely even with careful use, it is difficult ee how it can be kept on for more a few years.

according to the 1966 Defence White ber, "The key to the deterrent power our armed forces is the ability to ain early warning of an enemy's intions through reconnaissance, and to te at his offensive forces from a diste in case of need. This role has been gned to the Canberras since the early 0s; this aircraft cannot safely continue r 1970."

learly, therefore, the Government has decided that Britain cannot afford doesn't need long-range capability. It from a commitment to NATO, t will happen if Britain is faced with odden need for long-range capability? sumably, she would have to rely on erican aid, with the usual strings ched. Immediate action will be used of defence planners to deterte how best to deploy the existing to make up for the shortfall.

he obvious alternative, at least I the mid-70s, will be the existing Vher force; this is not suitable for longed operation at high speed and level, especially in Europe, which beinences some of the worst environ-



The Canberra, the replacement for which was sequentially the TSR.2, F-111, AFVG . . .

mental conditions in the world. Of the two types in the force, something like 50 Vulcan 2s will remain in service until 1975 with about the same number of Victor 2s. These, however, will be phased out somewhat earlier.

The early retirement of the carrier force in 1971 will result in a spill-over of 48 Phantoms and about 100 Buccaneers; if HMS Eagle does not have a refit for Phantom operation, as seems probable, there will be a transfer of some Buccaneers and about 24 Phantoms to the RAF inventory before the general carrier phase-out date of 1972. The Buccaneer will probably need a certain amount of refurbishing, within a limited budget, to bring it into line with RAF requirements and will have appreciably better lowlevel long-range performance than any other aircraft in the inventory, comparable with that of the Canberra, (probably about 600-mile radius in the lo-lo role as against about 400 and 1,000 for the Phantom and F-111 respectively) while having an airframe which was designed from the outset to withstand the stress of continuous low-level operation.

Notwithstanding the loss of the F-111, which cannot be made up, the RAF will, in fact, have a powerful and balanced (albeit purely tactical) striking force during the 1970s. There is a strong possibility that Harrier strength might be greatly increased from the 60 at present on order. It is almost impossible to overestimate the importance which this, the world's only production V/STOL aircraft, will have in the RAF and NATO.

The future of the United Kingdom variable-geometry project is still obscure. Official Government policy, stated last year, is that Britain can no longer afford unilateral development of major aviation projects. Although a financial crisis debate is not the occasion to enthuse over future aviation projects (and indeed no mention of UKVG was made in this one), the cancellation of F-111 must brighten the eventual prospect of developing such an aircraft. Whether or not this will come about as a result of a sale to Germany or a new alliance with France will remain to be seen. If Britain cannot afford to "go it alone," no more can France or Germany, and the next major European project must again be co-operative. If Britain stops VG work now, while France continues with her experimental Mirage G programme, there are no prizes for guessing where design leadership of the next project will go.

Industrially, the effects of the cancellation may not be known for some time. There are three aspects here to consider: the effect on contractors supplying equipment in direct support of the F-111K programme; the contractual penalties which Britain will be required to bear as a result of defaulting; and the effect of cancellation on the F-111K offset sales agreement.

Although the British content in the F-111K is comparatively small, a number of UK firms have sizeable stakes in the programme and an estimated £20 million has been lost by the avionics industry. Elliott-Automation, for example, had a contract worth £2,500,000 for the supply





of automatic ground check-out equipment. Although developed for the F-111, the digital techniques employed should enable the equipment to be used, with re-programming and relatively minor changes, for other aircraft. Again, a similarly valued contract with Miles Electronics for three flight simulators will have no further application (although the Elliott computers could be resold) and the firm anticipates redundancies. Among suppliers of airborne equipment are EMI with a development contract for £2 million for the reconnaissance equipment. This was to have been followed by a £6 million production contract. The equipment itself, comprising sideways-looking radar, linescan and cameras, is similar (although packaged differently) to that which the company is supplying for use with the RAF Phantoms. With the transfer of the Navy's F-4Ks to the RAF, some of this loss may be retrieved.

Other firms with F-111 contracts included Cossor, Marconi, Plessey, Standard Telephone and Cables and Ultra Electronics. Much of the equipment being built by these firms is standard and could be used "as is" or with repackaging. It seems certain that a reduction will be inevitable in the number of Martel missiles which will be ordered.

The contractual penalties have been quoted as between \$40 million and nearly \$400 million; it is believed that a more realistic figure would be about \$120 million (£50 million).

Lastly, but probably the most impor-

... and V-bombers, of which the Vulcan will serve in the tactical role until 1975...

tant of all, will be the American reaction in respect of the offset costs agreement. Under the terms of this agreement, British firms were allowed to tender for American defence equipment under the same conditions as American firms, up to a maximum value of \$325 million, recently extended to \$425 million, as a defensive measure against-no doubt British-cancellation. Although this limit has not been reached, a number of very important contracts are being implemented. To date, 30 firms have contracts with the United States Government and their total value is \$183.7 million. Prominent among these firms are Elliott-Automation (head-up display equipment for the LTV A-7D Corsair II, worth \$40 million; and steering equipment for Lockheed C-5A Galaxy, \$4.37 million); Rolls-Royce (joint production with Allison of the TF-41 engine for the LTV A-7D, worth \$82 million); Brooke Marine (three salvage tugs, worth \$24 million); and Handley Page (11 Jetstream 3Ms for the USAF, worth \$5.95 million).

A number of these contracts, notably the development of the TF-41 engine, are well advanced and punitive action

"Flight" photograph



. . . while the miraculously un-axed Harrier will do the short-haul strike jobs, in possibly larger numbers . . .

. . . and the five VIP Comet 4s will receive non-VIP treatment-early retirement



could be as damaging to America as Britain. The TF-41 is a good exam of this; designed specifically for A-7D, there is no alternative eng available within the limited time so Indeed, development A-7Ds will emp the Pratt and Whitney TF-30 eng while deliveries of the TF-41 get und way.

Seemingly, the most vulnerable these contracts is that for 11 Hand Page Jetstream 3Ms, worth \$5.95 mills for the USAF. Although signed we recently, negotiations have been und way for some 18 months and 1 AiResearch TPE331-engined version we due to fly this year. It is understood the options by the USAF on a further 1 exist.

The possibility of a Canadian on for Jetstreams is now considered Ottawa to be unlikely, due to cutha in Government spending. Canada da however, want the aircraft and an entual order worth \$20 million is likely.

One thing seems certain: there can no broad action in respect of these a tracts; each one will have to be evalue on its merits, and in lieu of a l Government decision to allow all exist contracts to stand, this is likely to the a considerable time.

Apart from the F-111, further saving will be made by a selective and en retirement of some elements of Support Command, so as to operate of the more efficient types. Among reductions so planned will be the Comet 4s, and the Argosy establishm which is at present in the Far East which, due to more severe environment conditions and a more arduous task, ageing more rapidly than those in United Kingdom. The 22 Britannias be kept on until their natural retirent comes about. Flight has, in recent we already recorded the demise of Hastings and Beverley force; and off types due for retirement soon are Belvedere (some 40 still exist), Pembrod Pioneer and Twin Pioneer.

While no production orders have be placed for the Sud-Aviation SA.340 is observation helicopter and the WG utility helicopter (total requirements which for Britain were understood ly year to be about 350 and 600 resp tively), it appears likely that the to procurement may be considerably le While discussing reductions and ca cellations, one must not, of cours neglect the 15 Chinooks, cancellation which was announced by the Gover t on November 15. Just as the loss he F-111 cuts off a very large part he strike spectrum, so the loss of this copter will deny to the RAF any ry-lift tactical load-carrying ability ter than that furnished by the sex or SA.330.

peressing news for the Navy was that carrier force is to be phased out nediately after the withdrawal of ish forces from Malaysia, Singapore the Persian Gulf. Three carriers are olved: HMS Ark Royal, Eagle and mes. It is understood that the comdo carriers HMS Bulwark and taur are not affected,

of the strike carriers, *Eagle* (at present the Far East) will need an extensive to enable her to take Phantoms. se such an operation would take months and there appears to be no is for an early start to be made, the rence is that this carrier will not rate Phantoms. Surprisingly, *Ark's* goes ahead, partly for dockyard boyment reasons, and by present toning she will be the only ship to de the Navy's newest acquisition and a rapidly shrinking world.

he Navy has nevertheless taken this ack with good spirit. In a signal to naval stations after the debate, Viceniral Gibson, Flag Officer, Naval Air mand, said: "If the Fleet Air Arm ed unduly about political decisions ting its future, we should all have stark raving mad some years ago. not underestimate the sadness and e of disruption we all feel but as al we have got our duty to do. We a challenge and we will, with God's and our own professional pride, our standards. We have a great of important work to do in the is to come." M.W.

man Minister Inspects Harrier

WEST GERMAN DEFENCE MINISTER, Gerhard Schröder, was to visit wker Siddeley's Dunsfold airfield to beet the Harrier on Tuesday, January Dr Schröder's visit is described as uine" and he will also visit Rollsce at Derby, as well as hold talks the MoD. The fact that his visit to nsfold follows immediately after a to Bonn by Mr Bill Bedford, HSA's a Harrier proselytiser, is said to be incidental."

here is, nonetheless, evidence that st Germany's interest in the Harrier not exactly flagging, as we remarked January 11. The ever-contentious stion of West German purchases to bet the Rhine Army's stationing costs cropping up again and the German test in Harrier might be significant this context, particularly as there is parently no German interest remaining the UKVG and Jaguar programmes.

x in North Vietnam

AERIAL RECONNAISSANCE over Haiong is understood to have revealed ent shipments by the Soviet Union to th Vietnam of surface-to-surface siles. These are reported to be Styx



The Beech Sandpiper, a new rocket-powered missile target, has been successfully flown by the USAF. The target is powered by America's first hybrid rocket engine, and is mounted under the fuselage of a Phantom

cruise missiles with a range of about 20 miles and an HE warhead of about 1,000lb. Styx is usually used in the ship-to-surface role, as in October when the Egyptians used it to sink the Israeli destroyer *Eilat*. Obviously there is no reason, however, why it should not be fired from land, probably with a considerable improvement in accuracy.

There is concern in Washington, as we reported last week, that the USN's overwhelming superiority in the Gulf of Tonkin could be threatened by Styx. If restricted to coastal batteries the weapon would be no threat to USN carriers, which could easily remain beyond range, but it would be effective against cruisers and destroyers which close with the coast to bombard land installations. Significantly it is USN destroyers and cruisers which, we reported last week, are being fitted with ECM equipment aimed against Styx. Its deployment could affect USN plans to re-commission the mothballed battleship New Jersey for service later this year as a bombardment platform.

Most major US bases in South Vietnam are on the narrow coastal plain— Da Nang, Chu Lai, Cam Ranh Bay and numerous others—and these could be vulnerable to shipboard Styx firings. Whether North Vietnamese patrol boats could in fact breach USN superiority in the Gulf sufficiently to make this threat effective remains to be seen, though Hanoi must be sorely tempted to return the US bombardment and bombing of North Vietnam in kind. This is, however, something for which the North Vietnamese have so far lacked suitable weapons.

But whether North Vietnam uses its new weapons purely in the defensive role, or offensively, their supply by Russia is seen by some commentators as another step in escalation of the war. This, together with the appointment as US Defence Secretary of Mr Clark Clifford, who is assessed as being more "hawkish" than the departing Mr McNamara, could presage a turn for the worse in Southeast Asia.

Bonn Opens NKF Campaign

THE WEST GERMAN GOVERNMENT is making a determined effort to interest other nations in its NKF (Neue Kampfflugzeug) project study for a G.91/F-104G replacement aircraft for the mid-1970s. Primary targets in the present campaign are the other NATO F-104G consortium countries, Italy, the Netherlands and Belgium; Norway and Denmark, which both fly MAP-supplied F-104Gs; Canada, with the CF-104; and, surprisingly, Britain. Dr Schröder, West German Defence Minister, on his visit to the MoD in Whitehall on Monday this week, was expected to sound out British reactions to dropping the BAC (Preston) VG project and joining in the NKF.

The specification outlined by the West German Defence Ministry calls for STOL—in little more than 1,000ft at full gross weight—and a high subsonic speed on the deck. Speed at altitude is to be over Mach 1.5. Various roles which the aircraft is to perform include air defence, close air support and interdiction. The last role would be performed by a twoseat aircraft which would also serve as a conversion trainer.

The two main German industry groups, VFW in the north and EWR in the south, are making studies independently. Proposals are expected in March. While it is expected that a joint proposal will be submitted, individual proposals may also be received by the Defence Ministry. VFW's work on the requirement centres upon possible developments of the at present experimental VAK 191B V/STOL aircraft, a joint project with Fiat in Italy.

EWR's study is essentially a scaleddown AVS, with one seat and a single engine. While retaining the swing-wings of the AVS, pop-out lift engines of the bigger US-German project are deleted. Main-engine thrust vectoring by means of a swivelling jet-pipe nozzle is, however, believed to be an AVS feature retained.

Main cause of the Defence Ministry's launching of NKF studies is fear that the US will abandon the AVS project, which is at present under study in Washington and Bonn. Certainly the climate for this aircraft has not appeared favourable for many months in Washington, where much more interest is being shown in the all-American FX programme, recently boosted by the award of study contracts to GD and McDonnell-Douglas.



B RITISH EAGLE are leasing their new Boeing 707-320C to a foreign airline. British-flown and British-maintained, it will be operating in competition with Britain. A sort of plane drain.

Don't blame British Eagle—or Laker Airways, who have leased their VC10 to MEA, who are in competition with BEA. Or Caledonian, who transferred their first 707-320C to an American carrier. They've got to find work for their fleets and personnel somehow. I forgot to mention that British Eagle have leased a One-Eleven to SAS and another to Swissair. Oh yes, and Channel are offering their Tridents and One-Elevens for lease or sale.

But all is well-the Edwards Committee is going to put everything right. It'd better.

Mr Denis Healey: A Statement

• This week I can exclusively disclose, to the relief of the whole country, that Mr Denis Healey, the Minister of Defence, will not resign.

Asked why the ruddyheck not, in view of the fact that he just never seems to be able to get anything right, a Monastery of Defence spokesman told me nonattributably that Mr Healey has been suffering from bad lack—and nonattributable bad luck at that.

Apparently it has been discovered that things go frightfully wrong when Mr Healey is wearing something green. It now seems certain that when the AFVG collapsed, when Mr Healey said that the AFVG and the F-111 would cost the country £700 million less than TSR.2, when the Chinook was cancelled, when the Island Bases strategy was scrubbed, etc., etc., Mr Healey was wearing green

Here's a baffling one. The picture was taken by John Yoxall. Answer next week (got to keep up your interest in the column somehow)





Thirty years have flown The Short Mayo Composite on the Medway on January 1938, the day before its first flight in the hands of John Lankester Parker. The was to provide long-range, high-speed mail services. The baby one was called "Mercu and the mother ship "Maia"

socks. Thus he feels that he need not resign.

Asked whether Mr Healey is going to get rid of his green socks, a spokesman for the Minister said that he could not speak for the Minister, but that this was most unlikely.

Air Marshals Will Not Resign

By our own correspondent

• Two thousand four hundred and sixty-five RAF air marshals told me last night that they will not be resigning in protest against the F-111 cancellation.

Asked why not, 73 per cent said that Mr Healey might accept, 86 per cent said that they liked the uniform, 81 per cent said they liked the travel and opportunities for meeting people, and 92 per cent said Don't Know.

• When the Board of Trade recently forced the independent airlines, against their will, to charge the public more for

> From the "Renfrewshire Gazette," December 14, 1967

Two fire engines and a tender, several ambulances and four police cars were there to meet the plane which fortunately landed safely under its own steam. Fly to JERSEY by the luxurious pressu VICTOR VISCOUNT AIRLINERS of BRITISH MIDLAND AIRWAYS

From the "Rutland and Stamford Merca November 11, 1967

certain holiday tours, I posed question Can It Get Any Dafter?

You cannot say I don't have influe The Board of Trade, the Governm department charged with furthering retardation of British civil aviat responded by forcing British Ea against their will, to increase fares London-Liverpool.

You can bet that somebody will & knighthood for that, and it won't anyone in British aviation. Curses, th goes my last hope of a BEM.

• From a Pan American advertises in the January 1968 issue of Real Digest: "You'll have a flight crew sees more miles of sky in a week t most pilots see in a lifetime."

World's most overworked pilots?

Roger Bass