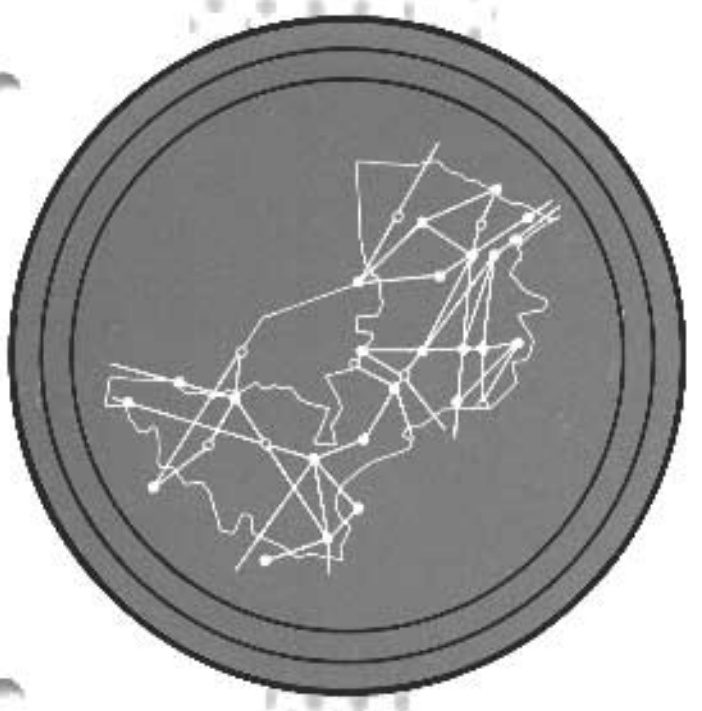


INPUT

AUTUMN-WINTER '79

Input

Egats Magazine

Address:
„Input", Postbus 47,
6190 AA Beek LB
Internal: Input locker 240

Editorial Staff:
Editor – Ian Guild
Assistant Editor – Paul J. Hooper
Advertising Manager – Fred le Noble
Artwork/Cartoons – Martin Germans

EGATS
EUROCONTROL GUILD OF AIR TRAFFIC SERVICES
A Member of IFATCA

Output

It is now almost ten years ago to the day that 15 of us, Ab-Initio Course Number 1, struggled through the deep snow that covered Luxembourg's Plateau de Kirchbourg in order to take up our employment with Eurocontrol.
How things have changed.
The Plateau is now covered by the buildings of various other European institutions which so effectively dwarf the Eurocontrol Institute that I was almost unable to find it on a recent visit. But this is not the only change that time has wrought; those of us who joined Eurocontrol on that day have seen our hopes dashed and our beliefs thrown into confusion – is there therefore any reason to be surprised that more than 50% of this course have since found other employment? The hopes were for a career and the beliefs were in, not only a unified European air traffic control service, but also a united Europe. The continued prevarication of successive Ministers in various member states, notably the Netherlands, has led to a now wide-spread impression that the federated, i.e. the Eurocontrol system, has been proven to be unworkable; an erroneous belief of the fact that, due to national jealousy and the ensuing refusal to delegate airspace to Eurocontrol, the federated air traffic control system in Europe has never been given the chance to prove itself.
But it is still not too late for the situation to be rectified.
Airspace users in Europe will shortly be faced with the prospect of paying Route User Charges equal to 100% of the cost. Is it not therefore reasonable for them to expect a service commensurate with the expenses incurred and not with those that will arise with the fragmented, overloaded, and disease-ridden air traffic control ,,system" of half-hearted, incompatibly modernised national systems that would follow Eurocontrol's untimely demise?
It might retrospectively prove embarrassing for our political masters, past and present, if a scheme now afoot amongst some of the so-called ,,emergent" nations should prove successful. This scheme, which was proposed by the Jordanian Director of Civil Aviation – The Sherif Ghazi R. Nasser – who announced at MECANON '79 (the Middle East Civil Aviation Conference 1979) which was held in Amman, Jordan, between July 4th and 7th under the moderation of Najeeb Halaby, past president of Pan Am and the FAA, the ,,Eurocontrol type of system in the Middle East", by establishing a joint upper airspace above the sovereign states of Iraq, Syria and Jordan.
The Sherif stressed that the system will produce three main advantages:
I) It will permit direct routes; thus reducing flying time and saving fuel.
II) It will reduce the amount of intersector co-ordination.
III) It will reduce pilot workload.
We wish The Sherif well in his endeavours.

I have lost count of the number of people who have recently approached me to ask where the latest ,,Input" is.
There is only one polite reply that I am unable to make after they have expressed their surprise at the fact that it is not yet written, let alone printed, and that is along the lines that I am still waiting for their contribution. Not a very original remark, I must admit, but nevertheless a truthful one.
,,Input" is not only for the members but it must also come from them.
Unfortunately this is not proving to be the case and so this was one of the reasons – the most important one – why the Executive Board has taken the decision to reduce the number of issues per year from four to two, a decision with which I am in complete agreement.
It would be very easy for me to fill the magazine with material lifted word for word from such illustrious publications as ,,Flight" or ,,Pilot", a temptation which proves difficult to resist as the deadline for the magazine approaches and passes with enough copy being received to fill three pages of the magazine.
This apparent apathy on the part of the members seems only to be matched by the difficulty that some have in finding their wallets. Yes, the other big reason for the reduction in the number of ,,Input" is financial. A lot of people still have not paid membership fees for 1979, and in some extreme cases for several years previous to that.
So, gentle reader, how about making two resolutions for the New Year;
1) I will write an article for ,,Input" this year.
2) I will pay my membership fee, and any outstanding debts to the Guild, at the beginning of the year.

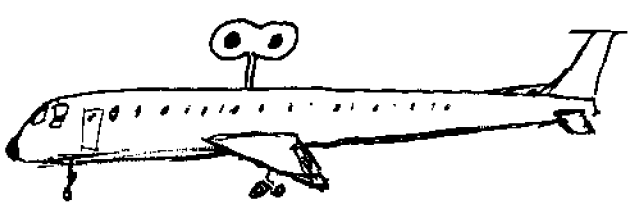
With effect from 1st January 1980 the annual subscription to the Guild is raised to *f* 125 for professional members and *f* 100 for ordinary members. The entry fee remains at *f* 50.

Annual General Meeting Friday April 5th

Intercom

Fuel for thought

During the past months much has been written in the sector log, or has been said at ,,canteen" level, and remarks have even flowed in on the frequency from aircrews. All this on the subject of a recent change incorporated in the Brussels West Sector with regard to level allocations for flights inbound to Amsterdam Schiphol.
Taking the B737 Flight Operations Manual (Section 4B-I, page II) as a reference, and allowing an appropriate margin of tolerance in respect of the seasonal climatic conditions encountered as well as passenger load factors and other relevant criteria, the following should be a fair calculation.
When a B737 initiates a level change from FL350 to FL280 during the last 35 minutes of flight, resulting in a ± 10 minute cruise at FL280 (instead of FL350) the additional fuel consumption can amount to 3,85%. On the basis of 1000 kgs. required for that segment this will equate to a penalty of 38,50 kgs. of fuel. Multiply this by an airline's total number of movements over that particular sector (i.e. CMB-ANI), 1500 in the case of Transavia for example, and you come up with a total annual fuel penalty of 57,750 kgs. or 72,187 litres. At the current price of Hfl. 0,58 per litre this amounts to an additional outlay of Hfl. 41,868. per annum.



Could this be the solution?

However, do not forget that this only represents a fraction of the overall figure if one considers the total number of CMB-ANI inbounds.
Naturally controllers are aware of the financial consequences to the airlines resulting from strict application of flight level allocations. No doubt they are also aware that with todays fuel crisis the emphasis on conservation must be considered more in terms of consumption than cost. The fact remains that airspace for civil airliners is restricted and will remain so. The controller's primary concern is that of safety and not economy.

With the present ATC system, the airliners' commitment to provide the travelling public with the schedules it wants, and the sheer volume of traffic resulting from this, safety and economy cannot be married. The only way they can ever conduct a harmonious relationship is to submit themselves to the protective guidance of ,,Uncle" Flow Control. But that's another story!

DPG. (There's no fuel like an old fuel!) (Another fossilised joke! ed.)

Guild activities for the last 3 months

The V.N.V. (Dutch Pilot's Association) had its 25th birthday in September. In Schiphol, on the 30th of August, we received from the President of the VNV, Cpt. Bildebeek, a copy of the book ,,Leven van de Lucht" a resumé of the history of Dutch civil aviation.
A few days later, in the Hague, a Delegation of EGATS (Domogala, Van Hal, Van Eck, Bonne) participated in their symposium ,,HUMAN FACTORS IN CIVIL AVIATION". We received much information material during this symposium, all of which is available for members in the Ops room file.
In a letter to the Director General, our President emphasised the concern of EGATS regarding the uncertain future in the Maastricht UAC and the consequences as seen by deteriorating morale and a significant number of resignations from experienced personnel. The reply to the letter did little to allay anxieties.

On the technical side, implementation of an attitude indicator within the radar display labelling was defered as a result of a guild sponsored initiative, supported by a majority of controllers.
We also gave to management our concern and views for the implementation of the 4th Brussels sector. For memo the policy of the Guild is: FIRST to make Planning beside Radar (in-line configuration), next to split the west sector taking into account the personnel situation.
Recently our President, B. Smeeth met, together with Staff Committee representatives, the D.G., Mr. Leveque. The outcome of the meeting was described in a joint statement bulletin from EGATS, Staff Committee and Union Syndicale and did nothing to boost morale.
Since the publication of the Report of the four concerning the future of Maastricht we are busy sending some information to adjacent guilds in an attempt to obtain their reactions.

We recently supported by telegram the associations of Italy and France covered by IFATCA resolution 5/73.
The constitutionnal committee, under the supervision of R. Bartlett, is busy shaping the new elections procedures. The elections for the new Board will probably take place in Jan - February 1980.
A Party committee (Pauwels, Domogala, Van Omen, Prevot) organised the bi-annual Party which took place on Dec 7th in Valkenburg. The Guild used this Party as a public relations event and we invited numerous airlines, Associations etc.
Final the Travel Section was busy these last months to obtain new facilities for its members. For latests news see publication Board.

Philippe Domogala
Vice President EGATS

..... AND LONDON

In the glassy tower at London Airport, Heathrow, or in a long and shaded room just up the road at West Drayton, or in similar humming establishments all over the world, poker-faced men in shirtsleeves sit riveted to radar screens and computer terminals in an atmosphere of studied hush and concentration. As numbered blips dodge about before their eyes, they can be heard to utter crisp, clipped messages into their microphones. ,,Speedbird five-niner-one, bearing two-six-zero. Good-day, gentlemen", one says to a departing VC-10. ,,Contact Heathrow Tower on one-two-one decimal five", a Trident is advised.

From British Airways High Life, April 1979.

NEWS FROM THAILAND.....

Sometime during September 79, the Air Traffic Controllers from BANGKOK airport went on strike. Apparently the police invaded the Tower, and the controllers broke the windows and threw out from the tower radar consoles, and other equipement onto the tarmac. Bangkok was closed for at least one day!!!

NETHERLAND.....

The Dutch language aviation magazine ,,Avia" published an interview with the President of the VNV, (the Dutch Airline Pilot's Association), in its September issue and a translation of some of Mr. G.H. Bilderbeek's comments are reproduced here.

Mr. Bilderbeek reiterated that the RLD (the Dutch Civil Aviation Authority) did very good work, even internationally, in many areas. ,,But I must honestly state that the RLD is a state within a state". The conflict between the (Dutch, ed.) air traffic controllers and the air transport pilots over the control and regulation of the upper airspace is seen as an obvious example of this by the VNV's President. ,,They say: that is our professional domain, we fulfil our tasks, so we see no reason why you should meddle in it". This strained relationship with the RLD upsets Bilderbeek. And, although the Secretary of State for Transport has always shown a reasonable attitude to the problem, he expects little comfort from the politicians. According to him it is the civil servants who have adopted this attitude. ,,They are extremely specialised, I don't want to use the term 'idiot-savant' but my thoughts go that way".
Whilst saying this Bilderbeek blinkers his eyes with his hands.

NEW AIRPORT TOO SMALL.....

A new ,,international" airport in Papua New Guinea is incapable of landing aircraft the size of Boeing 707s. There are also allegations in Australia that 18 million dollars of taxpayers' money has been wasted, according to an item in Flight.
The runway is some 30m narrower than the international standard, while its surface is too thin to carry the load of large aircraft. Only seven flights now operate in and out of the airport each day. These are restricted to aircraft up to the size of F-27s. Meanwhile, the international airport near the centre of Lae which the new airport was meant to replace handles 250 flights each day.

DRINKING IN THE AIR.....

More and more problems are being created by passengers drinking on long distance flights, according to Viktor Jauering, president of Lufthansas' pilot association, during an interview with Der Spiegel.
,,No month passes without the crew having to deal with intoxicated passengers. What was, in the past, typical for day trips has now become normal in air transport, getting smashed on board".
The biggest noise makers are Germans on board flights to or from Thailand or lands around the Mediterranean Sea, British footballclub supporters on their return flights and Scandinavians who drink heavily on almost all routes.
This drink problem does not occur only on Lufthansa, almost all airlines share it.
Most companies have a rule that a drunk will be refused boarding and that no more alcohol will be served to someone who seems to be becoming drunk on board.

JUST A WEENY BIT OFF COURSE

This story comes from the British General Aviation Safety Committee's ,,Flight Safety Bulletin" via ,,Pilot" magazine:
The following item appeared in the Friday, 8th March, 1979 edition of the ,,Liverpool Echo";
Flying Gran Hits Trouble In Storms
As gale-force winds battered many parts of Britain today, a 70-year old grandmother was waiting to return to Ireland after her light aircraft was forced down in Anglesey. She had left Cork with a man aboard the fourseater Cessna aircraft bound for Dublin but was blown off course, and with the help of radar, managed to land at the RAF Valley airfield. The wind was so powerful that RAF personnel had to hold on to the aircraft to prevent it being blown over. On board were Mr. ..... and Mrs. ..... Mr. ..... said one of his navigational aids had broken.

Now hear the other side.....
In the RAF's Distress and Diversion Cell at the London Air Traffic Control Centre (Mil) a voice was heard on 121.5mHz counting from one to ten and it was assumed to be an R/T check (The D & D report does not say whether the figures were in the correct sequence). When the transmission was repeated, however, Drayton Centre enquired whether there was a problem. It appeared that there was: the pilot said that he was lost over Ireland. Flash calls to Shannon and Dublin revealed that, yes, an aircraft had planned to fly from Cork to Dublin. Drayton offered to assist by providing Dublin with bearings from Valley and Liverpool but, alas. the plot worked out as 15 nm norht west of Valley! This position was then confirmed by St. Annes radar. So Valley was given control of the ,,Flying Gran". At this stage the question of circuit checks arose. ,,Set QFE .....".
,,I'm not after having one of those, sor!" etc. But after the aircraft had landed, Dublin said that they did not want the aircraft back until the following day – or ever.

Roger Bacon defines

an ACCIDENT as ten things going wrong at once
an ACCIDENT as nine things going wrong at once
AIR SAFETY as eight things going wrong at once

From the CAA's Staff Newspaper ,,Air way" I liked the following story; the following conversation took place at Heathrow at 0710 zulu.

Tower: Speedbird... I've some good news and some bad news. Which would you like first?
Pilot: The bad news.
Tower: Your take-off time is not before 0900.
Pilot: OK. What's the good news?
Tower: You're going today.

The airline captain went for his annual medical. All went well until he came to the eye-sight test. He could barely read the top line from a distance of two metres. ,,Good grief" exclaimed the doctor, ,,how on earth have you managed to keep flying?". ,,No problem" replied the captain. ,,When we come down the approach I sit back in my seat, relaxed, arms folded. As soon as the 1st. officer screams ,,Aaargh!" I pull back on the control column and reduce power...."

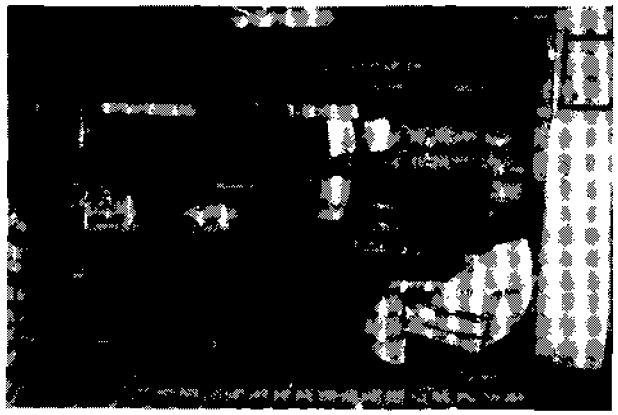
Pat and Mick were making their first flight, flying in a Viscount from Dublin to London Heathrow. Halfway across the Irish Sea the No. 1 engine suddenly stopped. ,,Ladies and gentlemen" announced the captain, ,,there is no need to worry. This aircraft is perfectly safe flying on three engines however, we shall be 15 minutes late arriving at Heathrow". Pat and Mick exchanged nervous glances but said nothing. A little while later the No. 2 engine failed. Again the captain reassured his passengers that the aircraft was perfectly safe flying on two engines but they would be 30 minutes late arriving at Heathrow. The two lads were by now distinctly worried but still said nothing. Shortly after this the No. 3 engine was feathered. Once more the captain assured his passengers that the aircraft could still fly perfectly safely even on one engine but that arrival at Heathrow would be one hour later than scheduled. ,,Begorrah" exclaimed Pat, giving Mick a very worried look, ,,'t is for a fact now that if that 4th. engine were to go and fail then we could be here all day and never getting to London before midnight".

As everyone is fed up of hearing jokes about Belgians, Irish and Polish minorities how about something different, eg the Latvian who phoned up an airline company wanting to know how long a flight to New York would take.
,,Just a minute", said the girl, who was very busy.
,,I'm very greatful to you, thank you very much", said the Latvian – and then hung up.


MAASTRICHT, BA 124 HEAVY.....
BA 124, MAASTRICHT HEAVY, GO AHEAD.....

30 years ago

When civil participation in the Berlin Airlift finished on August 15, a total of 144,500 tons of food, fuel and other supplies had been flown into the City by British civil aircraft. Up until August 10, the civil Airlift had made 21,785 flights to Berlin and had delivered 54,325 tons of food and 87,474 tons of liquid fuel. The last flight was operated by a Handley Page Halton of Eagle Aviation.
For those who are interested the number of sorties flown by the various charter companies taking part were: Flight Refuelling 4441; Lancashire Aircraft Corporation 2760; Skyways 2730; B.S.A.A. 2619; Bonds Aviation 2496; Eagle Aviation 1023; Airflight 977; British American Air Services 661; Westminster Airways 544; World Air Freight 507; Scottish Aviation 381; Aquila Airways 266; Silver City 213; Transworld Charter 118; Airwork 74; Skyflight 40; and early Dakota operators 1988.
On September 4, earlier than even the most optimistic observers thought probable, Bill Pegg, chief test pilot of the Bristol Company lifted the 94 ton Brabazon into the air for its first 25 minute flight.
The Brabazon was to have had a range of half-way round the earth, or at least to be capable of carrying passengers non-stop from London to New York, an ambitious range in 1942 when the project was first mooted.
One and a half Brabazons were built before the decision was made in 1952 to cancel the project and the aircraft were scrapped.

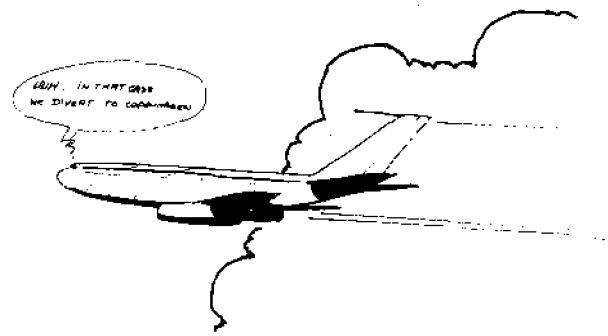


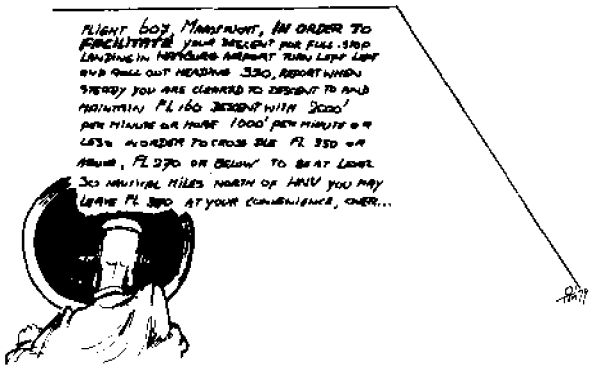
ATC in Senegal

The Dakar Air Traffic Control Centre is situated on the airfield there and provides both approach and Area control.
The area of responsibility is exceptionally large comprising Senegal, Mauritania, Guinea, Mali as well as the West African Oceanic Area.
At the time of writing all control is done procedurally, but it is hoped that radar will be available for the TMA in 1981.
Although poorly equipped by our standards they fare better than some, as they have direct sattelite to two adjacent centres (Las Palmas and Recife in Brazil), Nouakchott in Mauritania is reached by HF and the other airfields amd adjacent centres (Azores, Antilles, Casablanca, Algiers and Niamey in Niger) by AFTN teletype. For ground to air communication they have 3 VHF and 4 HF frequencies.

The number of movements is not very high, the Centre handling about 25.000 per year. To handle this traffic there are 26 controllers, who when fully qualified recieve about Hf 1.000 per month for a 46 hour week. This is not a very high salary, even in Dakar, for comparison a F27 pilot of the national airline, Air Senegal, earns 3 to 4 times as much. Their retirement age is 55 – on this point at least they are better off than we are!!

P. Domogala





Air misses over West Germany

The following explanations are based on material offered by the BFS/Z (Bundesanstalt für Flugsicherung/Zentralstelle) and do not take into consideration incidents with purely military participation.
The total number of air misses shows a falling tendency since 1976 (216); a decrease in 1977 (156) of 28% and in 1978 (139) of 11%.
The military quantity decreased accordingly: **1976** (78) = -32%, **1977** (57) = -27%, **1978** (51) = -10%
The military participation in incidents of the categories A (direct risk of collision) and B (indirect risk of collision) was on average 37%.
Incidents reports against aircraft under control of NATO - Air Defence Radar Sites in Central Europe (all systems) were:
1976 25 reports including 2 A + 5 B
1977 23 reports including 0 A + 7 B
1978 15 reports including 3 A + 3 B
Incidents reports against aircraft under control of military ATC were:
1976 7 reports including 1 A + 3 B
1977 6 reports including 2 A + 0 B
1978 5 reports including 0 A + 2 B
With the implementation of the ED-R9 the main amount of air misses shifted to below FL 100. Prior to the VFR-restriction the relation of below/above FL 100 was 60 : 40. Thereafter the relation stabilized at approximately 85 : 15.
Because of the high concentration of General Aviation in the height band below FL 50, the majority of air miss involvements concerned General Aviation pilots.
The same can be said below 1500' AGL for pilots of military jet aircraft and between FL 245 and FL 360 for aircraft under control of Air Defence Radar Sites. Seen geographically, the area Düsseldorf-Köln/Bonn stands on top of the list.
Indeed gratifying is the constant number of incidents of category A within the height-band above FL 245 (0).
Reports are filed in the ratio 75% by civil pilots and 25% by military pilots. Commercial pilots are in the majority in the reporting of dangerous situations.
As reasons for air misses between aircraft were seen so far (specification in percentage):

	1976	1977	1978
offences against laws and regulations	50	50	58
mixed traffic IFR/VFR	27	27	18
equipment failure (A/C)	1	1	1
Air Traffic Control (civil/Military)	14 (10/4)	15 (10/5)	10 (8/2)
below minimum separation by Air Defence Radar Units	3	3	4
unknown	4	4	9

Approximately 8,5 million movements per year were registered during the last three years. This means, relative to air misses, that seen statistically, 55,000 movements take place before one air miss occurs.
Converted into percentage this gives a value within thousandths, or, shown as a factor, the value 10^{-5}.
A valuation of Air Traffic Control within the airspace of the Federal Republic of Germany gives, in comparison with Collision Avoiding Systems (desireable safety factor 10^{-7}) an optimistic result.

(from "Brief 7/79, press-publication of the AFSBw)

Say again your type ?

PIPER PA.31T SURVEILLANCE CHEYENNE II

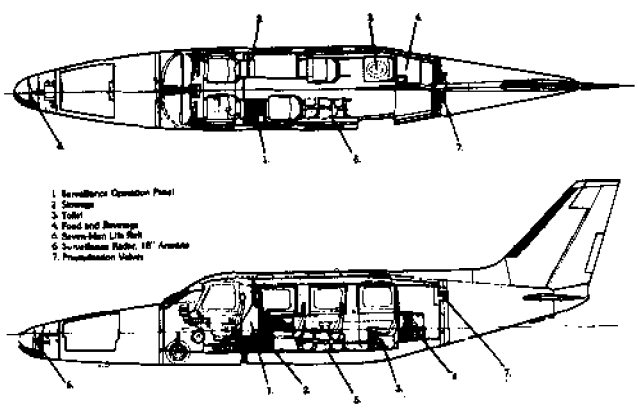
As part of its European tour the PIPER SURVEILLANCE CHEYENNE II was demonstrated at Rotterdam Airport from 31 October till 2 November 1979. On the final day Jim Creegan and I were invited by New European Air Services (NEAS) for presentation of this new variant.
My initial encounter with N431PC came on the evening of 30 October when she called in 18 miles out of CMB at FL240 en route Rotterdam. At that very moment the „impossible" had happened, i.e. the largest callsign on my screen was „STATIC PICTURE" and the Electronic Control Messages were flashing in and out like a rehearsal for next seasons Blackpool Illuminations! However, very shortly the back-log of estimates had been input and N431PC had correlated.
The SURVEILLANCE CHEYENNE II at Rotterdam had previously completed a demonstration tour of South America and was fitted out for Maritime Surveillance role. It has a wing span of 13 m., max. take-off (and landing) weight 4082 kg., max. range 1660 nm (3078 km) at FL290. Operational endurance is circa. 6½ hours. Power plants are two Pratt and Whitney PT6A-28 turboprops with 620 shaft h.p. each. TBO is 3500 hours. Rate of climb between 2000 and 3000 f.p.m. Service ceiling FL340. Search missions would normally be conducted at 5000 ft or below at 150 kts. Normal cruise speeds are 277 kts at FL160, 268 kts at FL210 and 250 kts at FL290. Equipment includes Bendix RDR-1400 multimode radar system providing high resolution radar reflections from surface vessels. Navigational system is Global Navigation Systems GNS-500A VLF/Omega. The Omega displays position coordinates, ground speed, drift angle, track angle, angle deviation, cross trach deviation, cross track distance, wind direction and speed, plus bearing, distance and estimated time en route to the next way point. In addition to the normal full VHF radio facilities the Sun Air ASB-850 HF transceiver for maritime use is installed.

Piper PA.31T Surveillance Cheyenne II N431PC at Rotterdam

Below the port wing a Vinten photo pod housed two roll film Vinten 70mm reconnaissance cameras with 100 or 200 feet film cassettes. Those on board N431PC were fitted with ELCAN (Leica, Canada) lenses. A hand held Agiflite camera is carried fitted with interchangable Zeiss lens. All photographs are annotated directly from the Omega with longitude, latitude, aircraft heading, date and time in Zulu. Many other forms of surveillance gear could be fitted in the SURVEILLANCE CHEYENNE II, including the Linescan 214 real-time infra-red system from British Aerospace or similar equipment from Honeywell etc.

Particular attention is paid to corrosion proofing making the SURVEILLANCE CHEYENNE II very suitable for coastal operations such as Fishing Detection, Detection of Water Pollution, Thermal Surveys of Coastal Areas etc. It is also ideally suited for Location of Forest Fire Centres through smoke, Control of Illegal Immigration, Detection of objects through Camouflage or Leaf cover, Location of underground pipes, reservoirs, etc., Thermal Surveys of Industrial and Domestic Areas, Passive Surveillance at Night or in Low Visibility.

Direct military application is detection of military activities such as Location and Movement of Vehicles, Aircraft, Ships and Personnel. At 1 million U.S. dollars a unit – about three times cheaper than its nearest rival – I feel sure it will prove a successful Piper venture. Or as the Piper ad. has it – More Airplane For The Dollar.



Aircraft diagram

Jim and I were aboard the last demonstration flight of the European Tour with Piper pilot Renald W. Davenport at the wheel. The idea was that we would shoot some shipping with our own cameras. We departed Rotterdam frequency at 1000 feet on a heading of 260°. A brief run through the Bendix radar controls (duplicated in front of Jim) and we were away. Operating over the North Sea in the vicinity of the Europort revealed no shortage of targets. What we first took for clutter materialized, on a larger scale, as ships! Two targets about 100 metres apart, 8 miles out about 45 degrees to our right were selected and we set course. Our pilot suggested we go down to 150 feet go between them so that we could shoot both port and starboard, turn about and repeat. Very soon we had them visual, revealing fishing boats. ,,..... too many birds, make it 200 feet ..... stand-by, coming up port and starboard ..... NOW!" As we flashed by I appreciated Renald Davenport's earlier query concerning the speed we planned to shoot at. 1/500th second was certainly desirable. We stood on the port wing tip to look into a small red dinghy and made several other ,,investigations" (sorry Coast Guard - did you get our number?!) before returning to Rotterdam landing after a Skyways DC-3. A very stable aircraft, highly manoeuvrable, an exhilarating ride.

Cockpit layout

In addition to N431PCs crew, our thanks to Piper team Director Cheyenne Division Bob Nielsen, Theo Schols, Director NEAS Nederland and to Dolf van der Scheer, PRO NEAS who also furnished the photos.

Bob Ruffle

A.G.M.
Friday April 5th

Instrument flying in the old days

Len Morgan (from „Flying")

A week after my first solo, they put me in the backseat of the yellow Royal Canadian Air Force Fleet, and the instructor took me up to 3,000 feet in deserted sky. I lowered the hood and began the first of many lessons in the art of instrument flying. Needle, ball, airspeed. Straight and level with needle centered, ball between the lines, speed pegged on 80. Timed, one-needle-width turns from north to south and back, then turns while changing altitude. And, on the fourth hood session, recovery from unusual positions including inverted flight and spins. My instructor spoke into a tin funnel, his coaching and comment reaching me via a one-way rubber tube. He was the world's finest pilot, and I strove mightily to please him. It was hard work but great fun.

It is interesting to inventory the wonderful apparatus that makes possible modern instrument flight – flight directors and autopilots, wing and engine heat, precision indicators, radar – and remember the Fleet's primitive equipment. Our jets rocket along at seven times its speed, weighing a hundred times as much, toward an airport reporting a visibility of less than an eighth of a mile, and we expect to *land* there. For all of that, the basics are the same: it is still work and still fun.

Until World War II, there was little American effort to fly routinely in inclement conditions except by the airlines. Europeans began passenger schedules seven years before us and were ahead in weather expertise. Their air forces operated in weather that grounded ours. Which explains why we spent hours on the gauges over Ontario while Randolph cadets practiced pylon eights.

Africa, 1942: C-47s moving men and freight in a vast project that was military in name, airline in philosophy – ground school, Link, route qualifications, line checks, the whole stateside airline bit. A string of hastily built fields with 4,500 feet of brick or blacktop were fuel and layover stops. Each had a nondirectional radio beacon, which worked best when you didn't need it. During storms, you could pass directly overhead and never know it.

Point-to-point navigation was strictly dead-reckoning, backed up with maps, such as they were. Mountains appeared where desert was depicted, and broad regions were marked „uncharted". Odd levels were flown eastbound with Kollsmans set on 29.92 for cruise – „altimeter setting" was not in the language. Separation was achieved on the spot: „Sam, you go on in and let me know when you're contact". A few large fields had towers to sort out the contact flight rules traffic.

The problems were sandstorms in the north and squall lines near the equator. Unless you've been in an African sandstorm, you cannot imagine what I'm talking about, nor can you understand the full implications of „rain" unless you've seen an equatorial downpour. If the destination was socked in, we usually learned of it too late to go anywhere else.

Boxing the station was the way home – flying carefully timed legs that formed a square around the homer, with a lower level authorized after each turn. The final glide was supposed to position the plane a mile from the field, flying toward it at 400 feet. In practice, the runway could be anywhere in the windshield, and if 400 didn't get it, there was nothing else but to ease on down a bit. Certain dirt roads, creeks and native huts were as important to remember as the frequency of the beacon.

Such was the state of the art. The loss rate was surprisingly low – so far below budget that we were soon flying around the clock. Compared with the Hump, where transport losses exceeded those of combat units, our work was a piece of cake.

Reno, 1943: C-46 training, with the emphasis on instrument flying. Once a pair of students had soloed, they went under the hood for the rest of the long schooling, from brakes off to short final, much of it with one feathered.

By World War II, there were 29,000 miles of controlled airways within the U.S. continental limits. By definition, an airway included a rotating beacon every 15 miles, intermediate fields about 50 miles apart, communication stations, range stations and marker beacons, weather reporting and traffic control. East-west routes were labeled red and green; north-south, blue and amber.

Green 2, for example, connected New York and Chicago with about 20 ranges and radio beacons. Two-letter codes identified stations; La Guardia was LG, Chicago CG.

We learned the art of range flying. „Take me back to the base", the instructor would say. Tune it in and identify the code. Dit dah dit, dah dit – RN for Reno. Listen. Dah dit, dah dit – a clear N, which means we're in the northwest or southeast quadrant. Fly the nearest bisector heading and turn the volume way down. Cruise along, study the chart, plan ahead, wait. Silence. Turn it up a hair and recheck. Another slow fade, so we're northwest. Reverse course and check again. The signal builds. In five minutes, a hum merges into the N as we near a leg. But which one? The hum takes over, then a faint dit dah is heard. Turn right 90 degrees – that's back into the hum, so it's the west leg. Bracket and fly inbound, seeking the feathery „twilight zone". The sound suddenly builds, then fades away. High cone. Turn to pick up the south leg, punch the clock, start down.

There was little help from the right seat and absolutely none expected. The man would sit there mute, nevertheless capable of nasty surprises. His mood depending, he'd tune in the wrong range, fail to hear calls for gear and flaps or forget the time over

the station. The concept of cockpit work as a team effort was years down the road.
Ride level through the procedure turn, then descend northbound and try for the narrow low cone. This was an instructor's favorite time to pull an engine, after covering the throttles with a cloth. Feel it with the feet: hard rudder is the good side. Retrim, recite the shutdown procedure, recognize the cone, punch the clock, drop gear and flaps, descend to minimums, set up for arrival, watch the time. Drive along and wait it out. There goes the hood, and there it the runway. Muscle the big truck around to line up, drop full flaps, cut the power, retrim and put it on the numbers. Taxi back for another, basking in the instructor's praise: ,,Very, very sloppy. You were all over the damned sky. Climb to 9,000 and show me another. And let's see a fade parallel orientation this time".

The low-frequency range's many shortcomings were revealed in class and by experience: multiple courses, false cones, beams that swung and bent as much as 45 degrees in the mountains, signals that faded on approach and built during retreat. Though radiations theoretically extended only 100 miles, it was not unknown to tune in a California station and receive a strong signal from one in Utah that used the same frequency. (Skipping radio waves did strange things; once while flying at night near Cairo, we heard Kansas City Tower as clear as a bell, much to the delight of my ex-TWA skipper). In snow or electrical storms, all range signals and voice communications could be lost for minutes on end. The more urgent the need for clear reception, the less chance of it.

The DF loop was a right-direction step but difficult to use and fraught with pitfalls. Its needle had a pointer on each end, which you put on the wingtips, then waited. Clockwise rotation meant the station was to the right, counterclockwise, left. Rough time-to-station estimates were reached by timing the swing through 10 or 20 degrees. Without continuous cross-checking, the device's 180-degree ambiguity could be lethal. ,,Reading the back of the loop" led the luckless *Lady Be Good* to a sandy grave 440 miles beyond its North African base and countless other aircraft to similar ends. The newer ADF eliminated this peril but was prone to point at storms, ore deposits and, under certain conditions, the wrong stations. In late afternoon and early morning, it sometimes went ape. Check, cross-check and check again was the drill. Use of the automatic feature of either receiver was not allowed. Rotate the loop manually, find the null and adjust volume to make it five degrees wide. Then fly the entire exercise using the tiny band of silence to keep track of the station. The aural null approach was, purely and simply, an invention of the devil.

Our field contained an early version of the radical VHF ,,three-element system". While its use was not taught, we played with it enough to appreciate its potential and even used it to make unauthorized letdowns in blizzards when the range was lost in static. The idea was later refined for general use and renamed ILS.
The airline, late 1940s: DC-4s and -6s on the premium runs, -3s out in the boondocks working low-freq aids into uncontrolled fields. The last light lines were being dismantled, and how empty the dark distances became. Intermediate fields were sold back to farmers and plowed under. The Air Age was upon us, wrote feature writers who'd visited La Guardia, but those of us out in the sticks wondered as we bounced along in converted C-47s, trying to pick beams out of the sandpapering in the headsets.

Clearances were obtained via HF from company operators who had direct lines to centers. The worse the weather, the longer it took to break in for permission to start down. The average tower had a single channel for ground and pattern control, and the man on the mike was one harried fellow during rush hours. Out on the airway you were – well, where you said you were. Between Tulsa and Oke City on Amber 4, you were supposed to be within the 10-mile width of the airway and were expected to make your estimate within five minutes. But when storms lay along the route, certain liberties were taken; a crew diverting 30 miles south of the centerline to avoid a cell would not be surprised to pass another trip making the same illegal detour. Whenever possible, we'd cancel, fly whatever course the situation suggested and pick up a hard altitude to reenter the system. We flew CFR whenever weather permitted, turning off the radios and enjoying the view.
The range remained the primary nav and approach facility at all except major terminals. Properly flown and with a bit of luck, it got you safely down to 400 feet, the remainder of the arrival depending upon, in poor visibility, a crew's familiarity with landmarks. Most captains put notebooks together during good weather approaches for reference on less agreeable days.
,,Turn right 15 degrees and watch for a water tank on your side. Drop on down to 300 feet. There it is. Okay. Turn left five degrees and watch for three houses in a row. See them? Hold this hearding and keep her coming. Here are the rest of the flaps. There's the runway. Take her on *in*".
Every range was on the wrong side of the field, or so it seemde. When the chips were down, you could bet on having to reverse course to land. The circling approach at old Kansas City Municipal was a hair-raising dash almost between smokestacks, across rail yards and grain elevators, while you peered through rain-streaked Plexiglas for the Town House Hotel's flashing sign, the pylon around which you banked to set up base leg. Then eastbound, uncomfortable aware that downtown buildings a mile ahead rose higher than your level, you'd strain to see the stockyards that led to the seed mill that sat on the edge of the river beyond which lay the asphalt. (Little did we dream as we trudged around the pattern at 75 knots that one day we would make the same ridiculous approach in a four-engine jet at 160).

We new-hires were reminded of how it had been in the 1930s with radioless Fords and Boeing 80As. „One night between here and St. Louis I got a load of ice.... put it in a pasture near New Florence.... same night that Robertson lost a Fokker at St. Louis". I was duly impressed and agreed that weather flying in the 1940s was a marvelous triumph of technology.

Thunderstorms. The -6 and Connie crowd flew at 25,000 feet, and their long runs made deviation possible, but we milk-run drivers worked down low with stops every 100 miles. The Chicago-Amarillo route hosts the most vicious springtime squall lines found on the continent, and each April the seniors fled to calmer skies and left us to deal with them. After hearing the experts confidently explain the life cycle of a storm and show their cutaway sketches, I came to a conclusion: not one of them could examine a line of storms on a given day and say for sure what's in it, under it or near it. They still can't. Airborne radar would in time eliminate some of the guesswork, though instant contact with other pilots flying in the area and the high performance of today's airliners are equal assets.

About this time, builders began listening to pilots on the matter of cockpit design. Settle on a grouping of gauges and controls, urged airmen, and stick with it. The trouble was that no one, least of all pilots, agreed on the best arrangement. And, too often, the „pilots" invited to help lay out new cockpits were old heads who had long ago given up flying for supervisory duties, and their grasp of current problems was apt to be tenuous. A new idea like VOR was regarded with suspicion and the indicator often stuck down out of sight behind the control column, while the familiar turn-and-bank went in the top row. In the beginning, „standardization" was 90-percent talk, and builders, anxious to please chief pilots (who influenced orders) continued to roll out as many cockpit versions of the same bird as there were names to paint on it. Had a pilot flown the same equipment all the time, there would have been little problem, but that was a day when many were qualified on two or thre distintly different types, each incorporating its builder's own brand of standardization. Indeed, all three could be flown the same day. This jack-of-all-trades concept was quite unrealistic; it inevitably led to confusion in tight situations and undoubtedly was a factor in some accidents. Happily, we perform today in an atmosphere of standardization.

The instruments used in the 1940s were reasonably accurate and reliable, but there was little attempt to present the overall picture or to display aircraft position in relation to airway or approach course. Isolated bits and pieces of raw data were extracted from the several dials and analyzed and correlated to form an image, not the easiest mental exercise when icing or a sick engine provided distraction. „It's like a boy watching a baseball game through knotholes in a fence", someone said. „Through one he can see home plate, through another the pitcher, through still another second base. What he needs is one *big* knothole". Modern flight directors are bigger knotholes, and some of the equipment coming up looks as good as tickets to the game.

By 1950, experiments with surface approach aids were under way. While ILS led you to 200 feet and left you in better shape than the 400-foot range, the riddle remained: what if you break out but still can't see the airport? Much trial and error resulted in today's complex approach and runway lighting systems; you may not be able to see the runway at 200 feet, or even at 100 on a Cat II, but usually there is enough of the „runway environment" in view to allow you to complete the trip.

„Instrument flying" has taken on a much broader meaning. Once it meant crude gauges to keep a pilot right side up in cloud, and a primitive radio for en-route guidance. Now it is a vastly complex procedure that begins when brakes are released and ends with roll-out, involving in the process an army of ground technicians and a dazzling array of airborne and surface electronics and lighting devices.

This rapid evolution has resulted in degrees of schedule dependability and flying safety undreamed of in the 1940s – unfortunately leaving the impression, even in aviation circles, that there's not much to it anymore.

Well, it *is* easier in that airframes and engines and systems and instruments and ground aids are better, simpler to use, more trustworthy. Crew training is better, the cockpit relationship is better, everything is better – in one sense. But look at what is expected – and delivered. Almost no weather is unflyable now. Last winter – the worst one most pilots can recall – airline schedules were the least affected of all public and private transport. Most delays and cancellations were not the result of flying weather but of snowbound runways.

A handyman with a hammer, saw and sack of nails can build a doghouse. Give him a shop with electric saws, drill press, lathe and router, and he can copy an Adams chair. Did the power tools make his work any easier?

Air Kent

September 17 saw the launching of Britain's newest Third Level airline when Air Kent inaugurated services on two routes linking Manston (near Ramsgate) with Brussels and Rotterdam using 8 passenger Piper PA-31 Navajo aircraft. The airline has been formed by a consortium of Kent businessmen to provide easy and rapid air services to Belgium and Holland for businessmen in the county of Kent, south Essex and south east London, who had previously been subjected to what Air Kent's Chief Executive, Robin Paine, described as an obstacle course to reach either of the two major London airports. He explained how a local businessman wishing to travel the 220 km to Brussels first had to face anything up to a three and a half hour ride to Heathrow or Gatwick. The result was that he would have to allow a total of six hours to reach the centre of Brussels. Air Kent's service more than halves that time thus allowing the businessman to complete his work in a day and avoid the additional expense of hotel bills. Naturally the service will be equally convenient to Continental businessmen who have commercial engagements with Kent's many industries.

Air Kent flights to Brussels are also conveniently timed for onward connections to major European and worldwide destinations. For this the airline has its' schedules incorporated in SABENA's reservation system.

On September 24 I took the opportunity of sampling the new service, flying from Brussels to Manston, and the many advantages that go with „third level" travel. For example, the relaxed atmosphere, no crowds jockeying for positions at the departure gate, rapid boarding facilities – only a maximum of eight pax to be boarded. Once aboard the aeroplane one immediately notices the excellent all round visibility afforded by the Navajo. The whole operation is more intimate even though there is no stewardess, but who needs plastic smiles anyway?

One of the principal highlights of this service is encountered on arrival at Manston, which incidentally is a mere 45 minutes flying time from Brussels. This former Battle of Britain airfield is the home base of cargo operator Invicta International. A number of other cargo airlines operate through Manston, however Air Kent is the sole scheduled passenger carrier. This means that on arrival the Navajo is parked immediately outside the terminal where disembarkation and Customs clearance is conducted smoothly and efficiently. If required Air Kent will arrange to have a hire car awaiting your arrival. Six minutes after having stepped off the aircraft I was clear of the airport boundary. Try doing that at Heathrow!

In conclusion, from my experience that day I would not have the slightest hesitation in recommending the Air Kent service.

Britain can boast but a handful of successful third level operators. Many have come and gone. The British public has yet to wake up to the advantages of this type of flying as have the Americans who, at the last count had more than 250 such airlines. Admittedly city centre to city centre distances in Britain are much shorter than in the US, but even so, in many cases the alternative form of transport in Britain can be very slow and laborious.

Over water routes have been largely responsible for the success of the established British third level airlines. Such is the case for Brymon Airways (S.W. England) and Aurigny (Channel Islands) whose over water routes involve serving popular tourist resorts in season in addition to year round schedules. Loganair and Air Ecosse (both Scotland) can thank oil related charters for a sizeable portion of their incomes, although the former has long provided the Scottish Highlands and Islands with essential scheduled and ambulance services, albeit with certain local government subsidies. Air Ecosse is quite new to the scheduled scene.

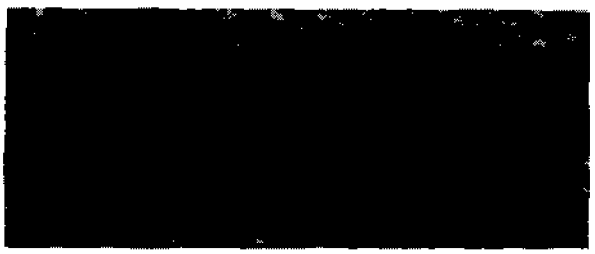
Air Kent is not serving routes directly associated with oil or tourism and doubtless the businessman will provide the primary source of income. However, the airline's International over water routes are serving a part of England which has long been in need of its own scheduled air service. Therefore, the formula for success looks most promising.

DPG

As we closed for press it was announced that Air Kent had suspended operations pending re-organization but no further details were available. (ed.)

Sixty years ago

THE SUMMER THEY CONQUERED THE ATLANTIC



The year was 1919: The ,,war to end all wars" was over and the League of Nations was about to meet to ensure that it remained so. It was the belief of some people that the great age of invention was over too, and that the Morses, Edisons, Bells, Faradays and Marconis had pushed technology as far as it would go, despite the fact that some crazy British scientists were going to try to photograph the total eclipse of the sun that autumn to show that light from nearby stars was actually bent by gravity, according to the preposterous theories of an obscure mathematician named Einstein.

Important issues were being raised in the newspapers of the time; an editorial in an American paper noted that unless America changed over to the Metric System of measurements immediately it would be unable to do any business abroad: ,,Of all the cowardly, unmanly, dastardly means of attack or revenge", another declared, ,,the bomb in the hands of a civilian heads the list". Aviation, sixty years ago the BIG frontier, was never far from the headlines – some dreamers believed that regular flights would one day be possible between Europe and the American continent and vice versa.

By the end of April it was obvious that somebody would soon make the attempt to cross the Atlantic Ocean by air and thereby win the considerable prize money which had been posted since before the war, and due to the prevailing winds it was obvious that this attempt would have to be made from west to east.

The United States Navy, which had been studying a possible transatlantic flight since 1917, commissioned a new series of seaplanes, the Curtiss NC type, on May 3rd. The aircraft's hull was 45 feet long, consisting of an oak and spruce frame covered with spruce or cedar planking and having provision for a five man crew. Its upper wing span was, at 126 feet, some 32 feet longer than the lower span. Between the wings were four 400-hp Liberty engines driving two-bladed Olmstead propellers (three puller, one pusher), all these powerplants being accessible in flight through hull hatches and ladders in the aircraft's rigging.

The four NC's were part of an elaborate plan. On May 5th it almost went awry when some fuel caught fire and consumed most of a wing of the NC-1 and an elevator from the NC-4. Commander John Towers, the USN's ,,air admiral" in charge, decided that the NC-2 should be cannibalized for parts to refurbish the others. On May 8th weather clearance was given and the NC-1, -3 and the -4 took off from Rockaway Beach on the south shore of New York's Long Island. Destinations: Halifax, Nova Scotia, Trepassey Bay, Newfoundland, Horta in the Azores, Lisbon, and then on to London.

Leaving as little to chance as possible, the USN was moving an incredible ,,picket line" of more than 30 ships, mostly destroyers, into positions at 50- to 80-mile intervals across the Ocean along the intended route of flight. To further help the aircraft navigators a special sextant had been devised in which a bubble centred in fluid served as a replacement for the natural horizon which might be obscured by cloud.

Aircraft -3 and -1 reached Halifax without incident. NC-4 however, had put into Chaham, Mass., where two Liberties were found to be faulty and engine changes were necessary. The two other aircraft went on to Trepassey Bay, Newfoundland, on May 10th, where, due to weather, they were forced to remain for five days. On the 15th the weather improved – but there was no sign of the NC-4 so it looked likely that -1 and -3 would have to make the attempt alone. During the evening they attempted to depart, but excessive fuel loads prevented their takeoff, and, as they taxied back towards the shore to lighten their loads, the NC-4 was seen approaching so Commander Towers postponed their departure until the following day.

At sunset on the 16th they lifted off minutes apart for the long over-water leg to the Azores. At about midnight the May moon appeared in a cloudless sky and the three seaplanes loosened formation, proceeding independently. The ideal weather was not to last long however, for by 8 a.m. small patches of fog began slipping past the NC-4, under command of the navigator, Commander Albert C. Read. They gained altitude, but were to remain in and out of fog or cloud for the next five hours. Shortly after 1 p.m. Read saw a rocky coastline through a rift in the clouds. They descended and put down at the island of Fayal; having determined their position they were soon able to get airborne again and complete the flight to Horta.

NC-1 saw its last picket destroyer, ,,Number 18", at around 11 a.m. and was off course shortly thereafter. An emergency landing in the choppy sea tore away a pontoon and damaged the tail structure. Fortunately the Gibraltar-bound steamer ,,Iona" happened by and got the crew off before the NC-1 disappeared beneath the waves.

The NC-3, with Towers as its navigator, had its instrument lighting fail during the night and so they climbed through the overcast to use the stars for reference. The winds at their new altitude were much stronger than forecast and rapidly blew them south of track. The ,,wireless" also failed, and in la-

ter landing on the sea in order to obtain more accurate fixes the plane was so badly damaged that it could not be flown again.
Determining their position to be 200 miles west of Ponta Delgada, Towers ordered the pilot to begin taxying. After two days, with men alternately manning the pumps and standing on the wings to balance the aircraft as it plodded through gales and seas, it pulled into Ponta Delgada.
On May 27th, the NC-4 glided into Lisbon harbour after a ten hour flight from the Azores. The historic first crossing had covered 3925 miles and taken 57 hours, 16 minutes of actual flying time – an average speed of 78,8 m.p.h.
Meanwhile, the scene in Newfoundland following the departure of the Navy mission had become almost chaotic. On hand in early May were four different makes of British aircraft: Sopwith and Martinsyde single-engined biplanes, a twin-engined Vickers Vimy converted bomber and a huge Handley-Page. Back in Britain, two Boulton and Paul bombers, a Bristol triplane and a Fairey single-engine seaplane were all regarded as possible contenders (the last was of particular interest since it had been fitted with innovative ,,variable-camber trailing edges" on its wings. These were later to become known by a much simpler name – flaps).
The United States Navy C-5, a 192 foot long nonrigid dirigible, was on the ground at Quidi Vidi, in Newfoundland, being prepared for the attempt. On May 15th, however a 40 knot gale blew up and a land crew of 100 men was unable to hold it in such a wind. That night the anchor ropes snapped and the C-5 blew out to sea, never to be seen again.
At noon on the 18th of May, aware that the NCs might be two-thirds of the way across, an Englishman named Harry Hawker, who had vowed to, ,,beat the Yanks across", decided to leap off in an attempt to at least make the first non-stop crossing. Hawker and his navigator, Mackenzie Grieve, pulled on inflatable rubber suits over their woolen flying clothes and started their 375-hp Sopwith biplane.
Six days later Hawker and Grieve were being mourned for dead when word came that they had been picked out of the sea, 1000 miles east of Newfoundland, by a Danish tramp steamer that had no radio. Defective circulation in the engine cooling system had brought them down in the sea 950 miles short of Ireland.
Hawker's departure had an immediate, impulsive effect onone rival Englishman, Frederick Raynham, who, with his one-legged navigator, William Morgan, was running up the engine of their Martinsyde only one hour after Hawker's departure. The aircraft started its takeoff run and seemed about to become airborne when the landing gear hit a ridge in the bumpy Newfoundland field and throw the aircraft on its nose – ending their chances but fortunately not injuring either of them seriously.

Far less impulsive, but just as eager, were the British team of Captain John Alcock and Lieutenant Arthur Whitten-Brown. Alcock had the more extensive flying experience – he had been shot down by the Turks whilst on a bombing raid over Constantinople in 1917 and had been a prisoner for the rest of the war – although Brown had made a name for himself as an aerial observer before crashing behind German lines. But neither had any extensive experience as a navigator.
Advised of the success of the NC-4 they spent several weeks near St. John's wedging extra fuel tanks into every possible corner of their Vickers Vimy and filtering every drop of the 865 gallons of fuel through wire screen and chamois cloth.
Early on the morning of June 14th Alcock and Brown observed that the rival Handley-Page entry – a four-engined biplane with a 130 foot wingspan – was engaged on a test flight, so they decided not to delay any longer even although a gale was threatening. At 12.13 p.m. Alcock opened both throttles wide and the twin 350-hp Rolls-Royce engines roared against the wind. Despite the small wingspan of the Vimy – only 67 feet – it was an easily controlled aircraft and was a favourite with pilots. Even so, it seemed to onlookers that Alcock must lose control of the overloaded aircraft and crash as they clawed over hedges and trees to gain airspeed and altitude.

The great weight of the extra fuel continued to tax both pilot and plane for some considerable time even after cruising altitude had finally been reached. Several hours out, in cloud, Alcock lost control. The Vimy shuddered and fell off into a spin. By the time that Alcock regained control he could see the waves just beneath him. After midnight the fog and cloud was replaced by snow and hail which, by morning, caused ice to form on the airframe and in the engine air intakes. As, at this stage, de-icing equipment was unknown, as was carburettor heating, Brown was forced to climb out onto the wing to clear ice from the air-intakes and the fuel indicators with a small penknife. He repeated this several times.
The weather gradually improved and eventually they sighted the Irish coast and decided to land as soon as possible to assure themselves of the prize money for the first non-stop crossing, rather than press on to England and risk failure over the Irish Sea. There was a wireless station in Clifden, Galway, over which the Vimy made a pass then settled into a likely-looking field nearby – which turned out to be a bog.
The plane nosed over. Unhurt, Alcock and Brown stepped out, rich and famous they walked into the history books. The 1890 mile flight had taken 16 hours and 28 minutes giving an average speed of just under 115 miles per hour.
But the summer was not yet over. On July 2nd the R-34, a 665 foot long rigid airship with two million cubic feet of gas in 18 separate bags, rose from a field at East Fortune, Scotland. Under the command of Major G.H. Scott, the R-34 was powered by five 275-hp engines driving pusher propellers; she had a large gondola forward, two amidships and one (housing two engines) astern. Eleven officers, nineteen men and a teenage rigger hidden in the enve-

lope (the first aerial transatlantic stowaway) stood regular four hour watches and were able to enjoy hot drinks and even phonograph music when not on duty.
Four days later, on July 6th, the R-34 appeared over Long Island, New York. A Major Pritchard parachuted from the forward gondola – as though it was routine – to make landing arrangements. The airship was duly tethered by 600 infantrymen and the first east-west aerial crossing of the Atlantic was complete. To prove her point the R-34 flew routinely back to her British homeland two days later.
Although it was to be some twenty-five years, and another world war to end all wars was being fought, before this crossing was to become commonplace the events of the summer of 1919 had laid the foundation for over water aerial operations.

Adapted from an article in the American Magazine „PM" to whom we extend our thanks.

FOKKER'S 60TH ANNIVERSARY

On 21 July 1979, Fokker celebrated its 60th anniversary. As one of the earliest established aircraft manufacturers in the world, the company can look back on a long and rich history. In those 60 years the company has developed some 125 different types of aircraft, both civil and military. Fokker is one of the few that has survived from the early days and still plays its part on the international aviation scene.

Sixty years ago, Dutchman Anthony H.G. Fokker founded the Netherlands Aircraft Factory Fokker, based at Amsterdam. He was only 29 at the time but already one of the world's best-known aviation pioneers.
Following education in the Netherlands, he went to Germany for technical training. It was in an empty Zeppelin hangar in Baden-Baden that he built his first aircraft in 1910. With this braced monoplane, the Spider, he gained his pilot's licence. In 1912 he founded his own firm, Fokker Aeroplanbau at Johannisthal, Berlin. When Anthony returned to the Netherlands in 1919, he was already world-famous as an aircraft designer and producer as well as a test pilot. He had proved to be one of those rare and remarkable aviation pioneers whose successes resulted from an unusual combination of airmanship, inventiveness, craftmanship, commercial insight and perseverence.
A characteristic structure formed the basis of the success of the early Fokker aircraft: a welded steel-tube fuselage covered with fabric, and thick-profiled wooden wings which in later types were built on the cantilever principle (without external bracing).
In 1919, one of the very first aeroplanes designed for airline operations was marketed: the Fokker F.2. This high-wing monoplane could carry four passengers in a well-furnished cabin and with its 185 hp engine cruised at 100 miles per hour. The F.2 was the ancestor of a long line of airliners which were used in all parts of the world. Fokker designed and produced the more powerful F.3 and, to meet an American requirement, the 11-passenger F.4. Flown by US Army Air Service pilots, this aircraft set new FAI world records for endurance, distance and speed. The climax of its career came in 1923 when an F.4 flown by Kelly and McReady made the first non-stop coast-to-coast flight across America, covering the 2,850 miles in 26 hours 51 minutes. The plane, the Army T-2, is preserved in the National Air and Space Museum in Washington.
In 1924 the F.7 appeared. This airliner, with accomodation for eight passengers, pioneered the air route between the Netherlands and the then Dutch East Indies. It was the progenitor of a very successful series of derivatives. The F.7a came into being in 1925 and was the world's first airliner with an air-cooled engine. It set world records for altitude and endurance with useful payloads.
Anthony Fokker founded an American branch of his company in New York as early as 1921, marking the start of an important contribution to the development of air traffic in the New World. Apart from civil transports, a long line of military aircraft was developed in the early twenties. They were sold in large numbers, many being built under licence abroad. To mention only a few: the C.1, C.4 and C.5 reconnaissance types, the D.10, D.11 and D.13 fighters, the S.1, S.2, S.3 and S.4 primary trainers and the T.1, T.2 and T.3 torpedo floatplanes.
In 1925 the F.7 was developed into the F.7a-3m Trimotor and the long span F.7b-3m, which virtually laid the foundations of many of today's major air networks. The Fokker Trimotor became the most successful airliner of those early days of commercial aviation. Most of the larger airlines in Europe, the US and Australasia, were operating these types. Licences to build them were sold to manufacturers in seven European countries and they were also produced in Fokker's own American plants. In addition to their multi-engined safety, reliability and passenger comfort, these Fokker Trimotors made many famous and historic flights.

These included the first flight over the North Pole by Admiral Richard Byrd and Floyd Bennett with the Josephine Ford. Flying this F.7a-3m prototype, Anthony Fokker had succeeded in winning the 1925 Ford Reliability Tour, thus establishing his name in American aviation. In 1927, only six weeks after Lindbergh, Byrd crossed the Atlantic in the Trimotor America and in the following year, Australian Charles Kingsford Smith made his daring flight across the Pacific from San Francisco to Australia in the famous Southern Cross. Amelia Earhart was the first woman to fly the Atlantic in the Friendship in 1928. It was this aircraft which, nearly 30 years later, gave its name to the Fokker F27 twin-turboprop. The American officers Spaatz, Eaker and Quesada, flew the Fokker Trimotor Question Mark for more than 150 hours in an early but striking demonstration of air-to-air refuelling. Kingsford Smith

continued his round-the-world expedition in the Southern Cross, flying from Australia to England in 1929, and the next year back to San Francisco, his original starting point. Meanwhile the F.7b-3m had inaugurated a regular service between the Netherlands and the East Indies, at the time the longest air route in the world. By 1930 54 airlines were operating Fokker aircraft and licences for their manufacture were sold to 22 countries.
Successes in the field of military aircraft continued with fighters such as the D.16, D.17 and D.21, the C.10 reconnaissance aircraft, the catapult-launched C.11W floatplane, the C.14W floatplane trainer, the T.4 and T.8W floatplane torpedo bombers and the T.5 bomber. Highlight in this era was the G.1 twin-engined, twin-boomed fighter.
The sturdy Trimotor was further developed into the F.12 and F.18 long distance airliners. This line culminated in the large four-engined F.22 and the mammoth F.36, which, with a capacity of 32 passengers, was at the time the world's largest airliner.
After 1934, the Fokker company concentrated on the design and production of military aircraft, at the same time acting as European marketing office for the Douglas DC-2 and DC-3 all-metal airliners.
Fokker's first own all-metal aircraft, the T.9 bomber, flew in 1939 and design work began on the F.24, intended as a DC-3 replacement.
Anthony Fokker died in December 1939 in the USA at the early age of 49. In World War 2 the Fokker factory was totally destroyed and the F.24 project had to be shelved.

The plant was rebuilt in 1945 and a nucleus of Fokker employees began design and production of a series of small military trainers, the S.11, S.12, S.13 and S.14 Mach Trainer, the company's first jet design.
A new factory was erected at Amsterdam Schiphol Airport in 1951, where several hundreds of Hawker Sea Fury and later Gloster Meteor and Hawker Hunter jet fighters were built under licence.
In the sixties, Fokker produced 350 Lockheed Starfighters, centre-wings of the Breguet Atlantic military patrol aircraft and centre-fuselages of the Northrop NF-5.
But in the early fifties, the company's directors and engineers were already preparing for a re-entry into the civil airliner market. This led to the introduction of the Fokker F27 Friendship, which made its first flight in 1955. The success story of the world's first twin-turboprop airliner is now well known; some 700 have been sold to date and production will continue for many years to come.
The Fokker F.28 Fellowship, the F.27s jet sister aircraft, has also clearly found its way into the world airliner market. Today, Fokker is a company involved in most aspects of modern aerospace activity' an acknowledged specialist in short-to medium-haul airliners, co-producer of military aircraft (currently the multi-national F-16 fighter), participant in national and international space projects, active in a wide range of research and development and manufacturer of several diversification products.

Sixty years after its foundation, Fokker is alive and working energetically on the consolidation and enhancement of its position in the international aerospace world.

Airship

The airship, which appeared to be doomed after a series of catastrophies fifty years ago, is now preparing its come-back. The energy-crisis and new technological developments which have drastically altered the design of ,,Zeppelins" have re-awakened interest in airships as a safe and economic form of air transport.
John Wood, the British designer of the AD-500 which is considered by many to be the most promising of the new generation of airship, is of the opinion that it will provide an inexpensive flying carpet in the not to distant future.
The airship is seen by aero-space engineers throughout the world as the form of transport for the future. There is already talk of enormous, nuclear-powered airships which will be able to carry 200 tons of freight to all corners of the earth and enthousiastic designers foresee the possibilities for luxurious passenger liners and for freight transporters able to lift 1000 ton loads.
Airship proponents argue that not only are the modern airships much safer than their predecessors but also that they are a reasonable alternative to conventional aircraft for many tasks as their operating costs are much lower and that they are relatively silent. Modern airships are filled with the inert gas helium instead of the highly inflammable hydrogen thereby minimising the fire risks.
The AD-500, the first commercial airship to be built in Britain since 1930 is a 150 foot long ,,cigar" with a steel-hard envelope of poly-urethane and titanium. The Venezuelan sponsor of the project has ordered 21 airships at a unit cost of 1,35 million dollars. The United States Navy is currently testing a specially developed patrol version in which the British Navy and the ministry responsible for fishing have expressed interest, seeing it as an ideal vessel for patrolling the fishing zones.
The AD-500, which is powered by two three-litre Porsche engines, is able to transport 2,5 tons of cargo and 14 passengers at a speed of 100 kilometres per hour according to John Wood. ,,We are not trying to compete with Concorde but I am of the opinion that airships can play an important part in aviation as a long-range form of transport. What makes the airship so special is its endurance. Our craft can remain in the air for 36 hours and during this time it consumes a maximum of some 300 gallons. There are helicopters that use this much in less than an hour".
From a theoretical standpoint there is almost no limit on the size of an airship or to the range over which they are able to carry their cargo. According

to experts it is now technically possible to build one with a greater capacity than a C5 (Galaxy) and that for a fraction of the cost. The ghosts of previous airships – such as the Hindenburg, which was the pride of the German fleet until its crash at Lakehurst, New Jersey on the sixth of May 1937, killing 35 of the 97 on board; or the British R 101 which crashed near Beauvais on the fifth of October 1930 killing 48 of the 54 aboard – will quickly be laid as the cost of fuel rises and the technology involved in the construction of these second-generation airships is perfected.

At the time of writing there are at least four major projects under way in Britain alone and others in the United States, Russia, West Germany, Japan and Australia. Here are some examples:
A British designer is building a ,,solar airship" powered by solar energy derived from millions of small solar cells on the upper surfaces of the envelope.
In West Germany Theodor Wüllenkemper is working on a 120 metre long version that will be able to transport 30 tons of freight. According to him this will be able to solve the transport problems in remote parts of the world.
The Russians are reported to be busy with an atomic-powered version that will be able to transport either 1800 passengers or 180 tons of freight at a speed of 150 knots and which will be able to remain aloft for up to six years!
The British businessman Clint Dawson wants to design an airship for passenger transport. His ship will have private cabins, large public rooms and even a ballroom and will offer the traveller an elegant and comfortable home from home during the three to four day crossing from London to Los Angeles.
European Ferries Ltd. which presently operates a sea service in the English Channel wants to buy two ,,Thermoskyships". These flying-saucer shaped craft which will carry 50 passengers at a speed of 80 knots will cost 4.5 million dollars and are planned to begin a service between Rotterdam and London in 1982.
Only time will tell if most of these ideas are realistic or whether they are all hot air.
Morris Jobe, the president of the Goodyear Aerospace Company which has over the years built 302 airships, recently told a Senate Commission that gigantic airships with rotors similar to those of a helicopter and with a lift capacity of 160 tons were already technically feasible. The main problem facing most these projects is financial. With the exception of West Germany and Russia the entire development costs are financed privately as governments are reluctant to invest money in airships until their worth has been proven.
As the British newspaper, The Financial Times, stated, ,,If the economic advantages of airships can convincingly be demonstrated over the next few years then the aviation industry has at least an alternative in answer to the growing problem of fuel shortages and rapidly rising fuel costs. Maybe the time will quickly arrive that these gracious, noiseless silver tubes re-appear in the sky in large numbers".

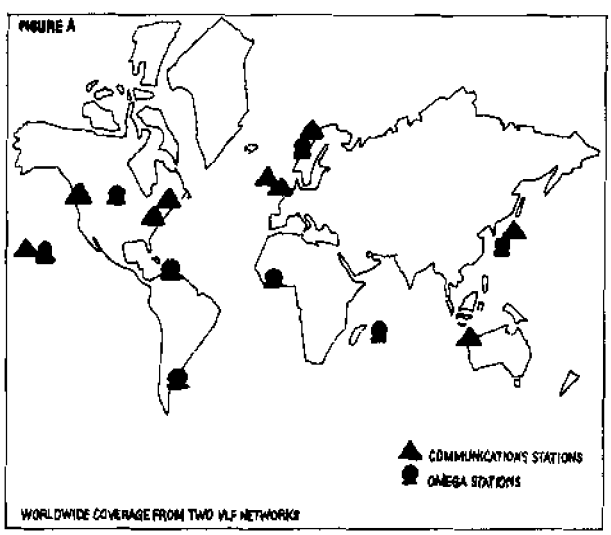
VLF Navigation

The following information on Omega/VLF navigation has been extracted from a booklet produced by Global Navigation Inc. for prospective purchasers of that company's GNS-500A system. (P.J.H.)

Q *Just What is a VLF Navigation System?*

A Basically it's any navigation system that utilizes Very Low Frequency radio signals as the navigational base. The Very Low Frequency, or VLF, signals used by aircraft navigation systems are transmitted between 10 and 24 kHz, falling into the 3 to 30 kHz VLF band. These signals have two characteristics which make them usable for navigation – long range and phase stability. These VLF signals are transmitted at high power and travel between the earth's surface and the ionosphere (200,000 to 300,000 feet). Each transmitter saturates about half the globe with signals – covering oceans, mountains, valleys and airways. It is important to understand the origin of these VLF signals. As shown in Figure A, there are two independent, worldwide VLF networks transmitting signals suitable for use in airborne navigation. These are (1) the eight station Omega Navigation Network operated and maintained by the U.S. Coast Guard, and (2) nine independent Communications Stations, most of which are operated and maintained by the U.S. Navy. The fact that the transmissions from each of these 17 stations cover approximately half the globe leaves little question about worldwide signal availability.

Q *IS VLF/Omega Navigation a Recent Development?*



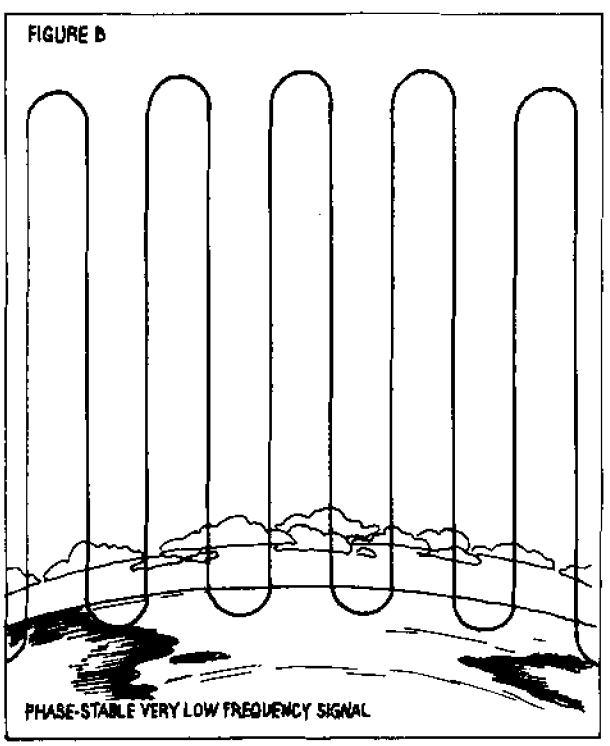
A Yes and no. While the first Communications Station began transmitting in 1902, it wasn't until recently that the precise frequency control made possible by Cesium frequency standards became available to make the signals useful for navigational purposes. And not many years ago a computer capable of using these signals for aircraft navigation would have filled a good-sized room. It has only been in the last few years that both the transmitting stations and the microprocessor technology necessary in an airborne navigation system have become suitable for practical VLF navigation.

Q *How Are „Communications" Stations Used for Navigation?*

A Each VLF Communications Station transmits a basic signal in either an FSK (Frequency Shift Key) or MSK (Minimal Shift Key) format, represented in Figure B. Once the computer determines which format is being used by a particular VLF Communications Station, it can use its signals for navigation. The fact that the U.S. Navy uses them for fleet communications does not detract from GNS-500A's ability to track the signals. And the fact that their primary military purpose is so important only helps assure their uninterrupted transmission. If a Communications Station changes its transmitting format while GNS-500A is using that station for navigation, the system's computer simply stops using it until it is reacquired in the new format.

Q *How are the Nine Communications Stations Different from the Eight Omega Stations?*

FIGURE B



PHASE-STABLE VERY LOW FREQUENCY SIGNAL

A Each Communications (or Comm) Station has its own assigned frequencies between 14 and 24 kHz and transmits on one of them with a radiated power of up to 1,000,000 watts. All eight Omega stations, on the other hand, transmit on the same three frequencies, 10.2, 11.33, and 13.6 kHz. They transmit in a segmented and synchronized format such that no two stations are transmitting on the same frequency at the same time, as shown in Figure C. The entire eight-station format is repeated every ten seconds. Each Omega transmitter radiates up to 10,000 watts, much less than a Comm Station.

FIGURE C

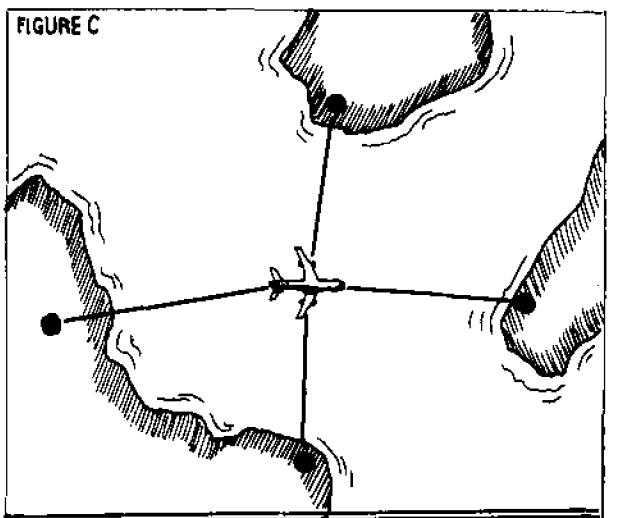
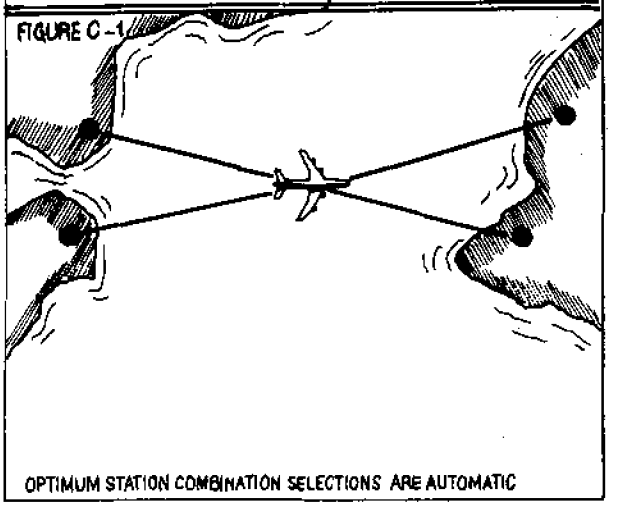


FIGURE C-1



OPTIMUM STATION COMBINATION SELECTIONS ARE AUTOMATIC

Q *Since the Entire Eight-Station Omega Network Uses the Same Three Frequencies, How Does the System Identify an Individual Station?*

A The navigation system's computer must figure out which station has transmitted each signal segment it receives before it can use that signal for navigation. This sorting process is called „commutation". The computer does this by matching the pattern of signals being received to the fixed Omega transmission format.

Q *Can a Navigation System Use Any of the Omega Stations Without the Commutation Process?*

A Two Omega stations, North Dakota and Hawaii, each transmit a ,,unique'' frequency in addition to the three primary frequencies. These unique frequencies can be tracked and used in a manner similar to the VLF Comm Stations. A VLF/Omega system incapable of performing the commutation process can only use these two Omega Stations. To use the entire eight-station Omega Network a navigation system must be able to commutate the primary three-frequency format.

Q *Is it Necessary for the Pilot to Manually Tune and Decipher all of the Comm and Omega Signals Using GNS-500A?*

A No, it's completely automatic. From station identification to tracking there is no need for the pilot to do anything. He can, of course, ask the computer how many stations are being received, how strong each one is, and so forth.

Q *Does Proximity to a Station Affect the Accuracy of GNS-500A in the Same Manner it Affects VHF Navigation Systems?*

A Not at all. A VLF system doesn't work like that. While seventeen stations is a lot of redundancy in the Very Low Frequency world, it's not a large number of geographic locations. You could easily fly a route where you are never closer than several thousand miles from any transmitter. A VLF system will work just as well on this route as on a route that happens to be near a transmitter. It doesn't matter. That's one of the beauties of VLF.

Q *Does This Mean There are No Line-of-Sight Limitations?*

A That's right. As far as altitude is concerned GNS-500A will work as well doing treetop level survey work in a valley as it will at FL370 over the middle of the Atlantic.

Q *Is Signal Availability a Function of Geographic Location if Not Altitude?*

A There are several things that affect the suitability of VLF signals for accurate navigation, geometry being one. Let's look at the following two cases as simplified examples of varying geometry. In each case we're assuming four station reception with equal signal strengths. In Figure C the aircraft is located geographically in a position that has excellent angular separation of stations. In Figure C-1 angularity is excellent in the East-West plane, but weak in North-South. Now add the real world conditions of varying signal-to-noise ratios, multiple station combinations and so on and it doesn't take long to see that determining signal suitability and optimum station combinations can be a very complex, ever changing problem. One that the pilot should not have to worry about. With GNS-500A he doesn't. GNS-500A displays a relative measure of all of these conditions, referred to as ,,Quality Factor'' or ,,Q''. A ,,Q'' of 2 is optimum, and 7 is the highest ,,Q'' with which the system will navigate in the VLF mode (as opposed to the Dead Reckoning mode). While the pilot can take the time to see which stations are being used, their individual signal amplitudes, and so on, it is faster and more meaningful to check the Quality Factor for the computer's assessment of its own ability to navigate with the available signal inputs. While VLF signals are not optimum everywhere, the Quality Factor should be from 2 to 7 anywhere you're interested in going.

Q *What Types of Positional Errors are Associated with VLF/OMEGA Navigation Systems?*

A There are sources of error that need to be looked at. But these error sources have no resemblance to VOR or NDB type inaccuracies. First it is necessary to study GNS-500A's basic workings. Before takeoff the pilot must tell the computer where it is by inserting the geographical coordinates of the starting point. After takeoff the system will figure the change in position from that point and compute where it is from this change in position. For example, let's say your initial position is Los Angeles International Airport, coordinates N33°56.5' W118°24.4' and you fly 293.3 NM on a true bearing of 320°. The computer will compute this distance and bearing change and show your present position as N37°37.1' W122°22.6' – San Francisco International. (The computer actually calculates the position ten times per second – this is just a simplified example). Now let's say you flew the same trip from LAX to SFO but had initially told the computer you were in Little Rock, Arkansas, N34°43.8' W92°14.0'. The computer would believe it was in Little Rock and compute the same change in position, namely 293.3 NM on a 320° bearing. When you landed at SFO the computer would show your position as being near Topeka, Kansas. Likewise, if the coordinates you input initially are one mile in error, your position display will be one mile off at all times during the flight. Other sources of error have to do with the signal processing that takes place in figuring this change in position. The magnitude of these errors will be affected by the number of signals being received, their relative geometry, signal strengths, as well as diurnal shift errors.

Q *What is Diurnal Shift?*

A Remember in the beginning it was stated that VLF signals travel between the earth's surface

and the ionosphere. With the height of the ionosphere constantly changing from day to night and winter to summer, the apparent speed at which the signals propagate is also constantly changing. Uncorrected, this phenomenon, called ,,Diurnal Shift'', would cause an error in computing the aircraft's change in position. In GNS-500A this diurnal shifting is corrected for as much as possible. The pilot inputs the Greenwich Mean Time and date into the computer along with the starting coordinates before takeoff. The computer uses the GMT and date inputs to individually correct each signal it receives for its diurnal shift before using it to compute the aircraft's change in position.

Q *Is a Problem Encountered if a Station the Computer is Using Shuts Down Temporarily?*

A No. GNS-500A uses the eight best stations being received for navigation, and holds any others as backups. Every 10 seconds it reviews the station combination in use to see if it is still optimum. If one of the stations being used drops out for any reason it will be replaced with the next best station within ten seconds. If there's no station available as a replacement it continues navigating with 7, or 6, or 5, or the number that are available – down to 2.

Q *Do Any of the Communications or Omega Stations Have Scheduled Periods Where They Shut Down for Some Reason?*

A Yes, all of the Comm and Omega Stations do require periodic maintenance of their antennas that does necessitate off-air time. The Communications Stations have a staggered maintenance schedule, with each station going off the air several hours a week. No two stations are scheduled to go down simultaneously. The Omega stations have an annual off-air maintenance schedule with each of the eight stations scheduled down for one month each year. At the time of this writing the schedule is as follows: March Argentina, April Liberia, May Hawaii, June La Reunion, July Norway, August Trinidad, September North Dakota, October Japan.

Q *Why Does GNS-500A Use Both Communications and Omega Stations?*

A In order to provide the computer with the greatest number of usable signals with the best geometry possible, no matter where the system is flying. Think of it as having two complete networks to choose from instead of only one – a larger base from which to select an optimum station combination.

Q *What Does GNS-500A Consist Of?*

A The basic system consists of four components with a total weight of less than 40 pounds. The Control Display Unit is installed in the cockpit and contains all controls and displays necessary for the operation of the system. Two remotely mounted boxes and a small blade antenna complete the system.

Q *What Installation Considerations are Associated with GNS-500A?*

A The primary consideration for the installation of the Control Display Unit is that it be within easy view and reach of the pilots. The two remote boxes referred to are normally installed together in the avionics bay or radio rack. They are both standard ARINC sizes and have no forced air cooling requirements. Being certified to operate at altitudes up to 45,000 feet, they may be installed outside of the pressure vessel. The location of the antenna is subject to several considerations including the avoidance of precipitation particle impact. Power requirements for GNS-500A are meager: 5.0 amps max of 28 VDC.

Q *Does the GNS-500A System Include a Standby Power Supply?*

A GNS-500A does have a small internal battery in one of the two remotely mounted boxes. However, its only function is to carry the system through momentary power interruptions such as those that occur during engine start and power buss switching. Should your operations require, your Global Installation Center will provide information on other equipment which can be installed to provide standby electrical power for extended periods.

Q *In What Form Does GNS-500A Present Navigation Information to the Pilot?*

A Navigation outputs are given in two basic forms: digital readouts and HSI/Flight Director displays. First let's look at the Control Display Unit, or CDU, shown in Figure N. It has a ten position rotatable knob controlling the selection of the digital readouts in the left and right data displays. The digital readouts include:

Greenwich Mean Time and Date	Groundspeed
Present Position latitude and longitude	Ground Track referenced to magnetic or true north
Waypoint coordinates for ten waypoints	Track Angle Deviation
	Cross-Track distance and Selected
Bearing to Waypoint referenced to magnetic or true north	Cross-Track distance
	Wind direction and speed
Magnetic Variation	System's Quality Factor
Distance and Time to waypoint	Aircraft True Airspeed
Drift Angle	

Standard outputs are available to drive the Course Deviation Indicator on the HSI/Flight Director to which the autopilot may be coupled. Information presented on the HSI is pilot selectable from VOR/ILS to VLF and incorporates appropriate annunciation. Optional GNS-500A outputs available (1) automatically slew the course arrow on the HSI to the Desired Track, (2) present VLF Distance to Waypoint data on the HSI's DME readout, and (3) drive the HSI bearing pointer or RMI needle. These three optional outputs are only compatible with certain types of HSI's.

Q *How Much Flexibility Does GNS-500A Provide in Terms of Course Selection?*

A The course selections are all referenced to pilot selected waypoints. It works like this – you insert the geographical coordinates of up to 9 waypoints into the computer via the CDU keyboard. These 9 waypoints can be reprogrammed (changed) any number of times so there's no problem with storage. Then simply ,,tell'' the computer where you want to go in one of the four ways. Either Waypoint-to-Waypoint. Waypoint-to-Waypoint with a parallel-offset, Present Position direct to any Waypoint, or finally the pseudo-VORTAC mode.

Q *Does GNS-500A Provide Any Functions in Addition to Real-Time Enroute Navigational Guidance?*

A Yes, one more thing. There is a computer access mode that might be described as a king of digital globe or map. It lets you look at the Desired Track, Distance, and ETE between any two geographical points. On the ground you can plan a flight with it. Airborne it will let you look ahead at future legs without interrupting the navigational computations or autopilot coupling on the present leg.

Q *What Type of System Failure Detection is Provided?*

A Each time GNS-500A is turned on the system computer undergoes a self-test. Should something be found wrong a digital code will be displayed to alert the pilots that there is a problem and just what that problem might be. Another series of digital malfunction codes will be displayed at any other time a component failure is detected. Appropriate annunciation is also employed to advise the pilots that the navigation data displayed is unreliable.

Q *What Provisions Are There for Continued Navigation During Temporary Periods of Inadequate Signal Reception?*

A Remember that GNS-500A can continue navigating with as few as two stations. But should there be insufficient signals to navigate with, GNS-500A does have a Dead Reckoning Mode. As soon as the Quality Factor reaches 8 the system will automatically revert to Dead Reckoning with appropriate annunciator lights and flags to advise the pilots. Navigational guidance will continue based upon the aircraft's heading, True Airspeed, and the last computed wind until such time as the signal reception improves to an acceptable level.

Q *Where Does the True Airspeed Input Used in Dead Reckoning Come From? Is an Air Data Computer Required To Input True Airspeed to GNS-500A?*

A No, an Air Data Computer tie-in is not necessary. The TAS can be computed by the pilot and manually inserted via the keyboard. Of course if there is an Air Data Computer installed it is best to let it talk directly to GNS-500A. However, in the normal VLF navigation mode the True Airspeed is in no way used to compute position, distance, groundspeed, or ETE. It is only used in this mode as an input to compute the wind. Only in the Dead Reckoning mode can the accuracy of the True Airspeed input affect the navigation position accuracy.

Q *How Much Attention Does the System Require Before Takeoff and Enroute?*

A The required pre-takeoff programming can be accomplished in less than one minute; the system will have the signals acquired and be ready to navigate in less than five minutes. Only two things normally need to be done enroute: define waypoints and select the desired leg to be flown. Once the waypoints are programmed and the first leg selected, GNS-500A can be coupled to the autopilot. Then there's nothing to do but watch.

Q *Is GNS-500A an FAA Approved RNAV?*

A GNS-500A has been certified under FAA Advisory Circular 90-45A for enroute RNAV operations in the 48 States, the District of Columbia, and Alaska. It is for enroute use on-or-off airways and RNAV routes. It is not certified for approaches. Global Navigation is constantly working to expand the IFR approval areas.

Q *Does GNS-500A meet all of the recently established requirements for flights over the North Atlantic?*

A Yes it does. Long range navigational accuracy requirements specifically tailored by ICAO for the North Atlantic airspace region went into effect in December, 1977. GNS-500A was already FAA approved to these ,,Minimum Navigation Performance Specifications'' (MNPS) prior to their going into effect.

70 years ago

„Ten minutes have passed and I turn my head to see if I am heading in the right direction. The weather is still bad and there is spume on the waves. There is nothing to be seen, no boat, no France, no England. I am alone with neither map nor compass. Alone in the sky above the Channel. And then I see the Cliffs of Dover and to the west the place where I wish to land. What can I do? I have been driven off course by the wind. I turn to the west and fly along the rocks; the wind here is stronger. Whilst I battle against it my groundspeed decreases. There is an opening in the rocks, a small field, and I decide to land. I am in the grasp of the wind, I cut the motor and the machine falls. However I land safely – the crossing was successful". These were the words of Louis Blériot on completing his crossing of the English Channel on Sunday July the 25th, 1909, in the time of 37 minutes.

Louis Blériot (1872 - 1936) begun his experiments in 1900 when he built a model ornithopter which actually flew. Spurred on by this success he constructed a full-size version, but this was a total failure. Painstakingly he continued and developed in 1907 the model VII, a milestone in the search for aerodynamic efficiency and good handling qualities. This was a low-wing monoplane, with an all flying tailplane, powered by a fully cowled Antoinette motor driving a four-blade metal airscrew. The aircraft was tested during the months of November and December at Issy and made a total of six flights during two of which distances of 500 metres and speeds of 80 kilometres per hour were recorded. On the 18th of December the aircraft crashed whilst landing but this did not discourage Blériot who continued to perfect the monoplane which had by now won itself a lasting place in the then still young world of aviation. This development did not proceed without problems however as some designs proved to be chronically unstable and Blériot had so many close encounters with death that he began to believe that he had a special guardian angel. After an expenditure of some *f* 350.000 on his experiments he finally had a design that was to remain unaltered until the start of the First World War. His type XI defined the formula for tractor-powered monoplanes. The Blériot XI appeared at the Salon de l'Automobile in Paris in December 1908. The aircraft was displayed in the aircraft section where it shared a stand with other Blériot designs including the type IX (a tractor driven monoplane), and the type X (a pusher driven biplane) neither of which had ever really flown, only the type IX having made a few short hops. The type XI however was something completely different. Its first flight was made at Issy on January 23rd 1909 and it was immediately obvious that it was a valuable, if not perfect, aircraft. The wingspan was only 7,77 metre and the length 7,62 metre. It weighed only 210 kilos and was one of the most elegant aircraft of its day. It is interesting to compare these dimensions with those of the Cessna 150 which has a wingspan of 10,15 metre, a length of 7,25 metre and an empty weight of some 560 kilos. One advantage of the small size of Blériot's design was that the aircraft was easily manhandled on the ground – it frequently occurred that during a cross-country flight Blériot would land near a farm, fold the wings, and store the aircraft in a barn.

The aircraft was originally equipped with a 30h.p. R.E.P. engine driving a four-bladed propeller but this combination was later replaced by a 22-25 h.p. Anzani engine driving a two-bladed wooden Chauvière propeller. Further changes concerned the controls; the area of the rudder was increased and the ailerons were modified so that they acted only as elevators, their original function being taken over by a form of wing warping. In this modified form the performance was outstanding for its day. Between May 27th and the historic Channel crossing the aircraft made a number of flights including one which lasted some 50 minutes.

Blériot was already considering the Channel crossing at this stage. In October 1908 the British newspaper, The Daily Mail had promised a prize of 1.000 pounds to the first pilot to dare the crossing in either direction. Louis Blériot, however, was not the only one who wanted to try it. His competitors were his countryman De Lambert and the Englishman Latham. The Compte De Lambert used a French-built Wright biplane which unfortunately crashed during a test flight and was so badly damaged that the count was forced to withdraw. Hubert Latham, a rich Englishman resident in France, was the first to attempt the crossing. On July 19th 1909 he took-off from the vicinity of Calais. Soon after, just as he crossed the coast, his 50h.p. Antoinette motor stopped. He made a forced landing on the water and calmly awaited the arrival of the French destroyer which was following him. The recovery of the aircraft so seriously damaged it as to render it unusable and Latham requested that a reserve aircraft be made ready.

Louis Blériot was meanwhile making his preparations a few kilometres further along the coast at Les Baraques. The machine that he intended to use differed somewhat from its predecessors in that it had a smaller tailplane and that the controls were operated for the first time by a rudder bar and a joystick. Daily, for almost a week, both Latham and Blériot had their machines made ready for the attempt but continuing adverse weather kept them on the ground. In the early morning of July 25th there was an increasingly strong wind and Latham's advisors, deciding that the wind was too strong, decided not to waken him. Blériot was awake and considered that it was maybe just possible to make the crossing before the weather deteriorated further. When his aircraft had been made ready Blériot climbed on board and nonchalantly asked, „Where is Dover?". A friend indicated the way and at 04.40 Blériot took-off on his historic flight.

When Latham learned that Blériot was already airborne he hurriedly had his own aircraft prepared but

to no avail as his friends refused to let him go because the weather was by this time too bad.
By now Blériot was also in difficulty due to the weather. He was caught up in a thick sea fog with a visibility of only a few metres and was flying by the seat of his pants. When he was about half-way over the Channel his engine began to overheat and although there was a flotation bag built into the fuselage to keep the aircraft afloat in the event of a ditching being made it was debatable that this would suffice in the large waves – the accompanying destroyer „Escopette", with his wife on board, lay far behind and had lost sight of the aircraft in the fog. The overheated engine was happily cooled-off by a sudden shower. Blériot continued until he flew out of the fog and found himself over the English coast. The strong wind had blown him off course but he found Dover by following the course of ships below which he supposed were heading to the harbour.
It had been Blériot's original plan to land at Shakespeare Cliff but the strengthening wind was becoming more than an annoyance and when a sudden gust spun the aircraft completely around Blériot decided that he had had enough and descended to land in a field near Dover Castle. The landing gear collapsed and the propeller broke but this was of no consequence to Blériot; he was the first to fly across the Channel.
„England's isolation is now over", were the words of one newspaper the next morning; even the most naïve armchair strategist began to understand that the new form of transport made a mockery of international boundaries – something that seems to be overlooked today – and that for the English the Channel, their broad moat, was no longer a guarantee for their isolation.
Blériot was made a Knight in the Legion of Honour and a few days after his crossing the French army ordered its first aircraft – more than 100 Blériot XIs.

The Hoop's column

EHBK 1961

As with the previous year it was the British independent operators who dominated the charter scene at Beek during 1961, with the Vickers Viking being the most prominent aircraft type.
Only Ambassador to visit the airport during the year was one of Shell's aircraft which arrived from and departed to Amsterdam on February 7. Nine days later Friendship PH-NVF operated a cargo flight to Venice for LTU. This aircraft, the second prototype Friendship, was at that time leased from Fokker but was later purchased by LTU. The same ship paid a visit to Beek earlier this year in the hands of WDL.
A similar Venice flight was operated on March 9 by Maitland Viscount G-ARER. Although not operational this aircraft still serves a good purpose providing office accommodation for a paint company in the vicinity of Clermont Ferrand following its' write off in 1971.
Yet another Venice flight was operated on March 31, this time by Viking OE-FAT of Aero Transport.
The summer season got under way on May 15 when Tradair Viking G-APOR arrived from Southend at 1240 returning 24 hours later. Initially daily, Tradair introduced a second Viking service on the 19th when G-APOR operated Manchester-Beek-Southend and return. The following day 'OR routed Manchester-Beek and vice versa, whilst G-AJFS flew Southend-Beek and back. Various combinations of this format set the scene throughout the summer months, at least until September 13 when four of the company's Vikings presented themselves at Beek. This became quite a frequent occurrence up until October 18 when G-AJFS brought the season to a close with a Southend-Beek and return. As with so many other British independent airlines of the era Tradair was experiencing severe financial difficulties. By November the company's major source of finance, Barclays Bank, was obliged to request the appointment of a receiver to manage the airline's activities. The receiver decreed that operations should continue but on the condition that a return to profitability was achieved within one year. Alas, a profitable operation did not materialize and, with debts approaching two hundred thousand Pounds, Tradair was acquired by Channel Airways in December 1962.
The season's first Palma flight was also operated by Tradair when Viscount G-APZB departed on June 19 thirty five minutes after arrival from Southend. Now here existed a somewhat ironic situation as I can only assume that this service was operated for Air Safaris who, at that time, were suffering – financial problems! Air Safaris origins dated back to 1950 since when they had built up a fleet of Vikings and Handley Page Hermes. During 1961 the airline was operating a network of scheduled services, based on Birmingham and Bournemouth, in addition to conducting a considerable inclusive tour program.

Air Safaris Hermes' departed Beek for Palma every monday having originated at Gatwick. For example, Hermes G-ALDT arrived from Gatwick at 1319 on June 26 departing at 1415. The aircraft returned from Palma at 2339 and departed for Gatwick at 0037. This operation was punctuated by the occasional Tradair Viscount, which on July 3 routed via Lyons on the outbound leg. The service continued through the summer months until concluded by G-ALDA on October 9. On the 31st of that month the same aircraft was able to claim the unfortunate distinction of operating Air Safaris' last service when it landed back at Gatwick after a flight from Lisbon.
1961 saw a small number of DC3 movements which included periodic visits by KLM and Martin's Air Charter machines. British Westpoint provided an example on August 6 when G-ALYF arrived from Southend at 0350, returning 37 minutes later and presumably operating for Tradair. Clearly the

Ulestraten anti-airport brigade had yet to make their presence felt in those times!
Tradair's lack of capacity, thanks partly to Air Safaris, would probably account for the appearance of British Westpoint, Channel Airways and Air Links DC3s during September.
British United DC3s visited throughout the year on what I believe were newspaper flights, routing Düsseldorf or Hannover-Beek-Gatwick. Viscounts substituted on November 16 and 17 although on the former date the aircraft overflew to Gatwick due Beek weather.
To bring the year to an interesting conclusion Argonaut OY-AAI of the Danish airline Flying Enterprise visited Beek on November 17 en route Copenhagen-Palma. 'AI made further appearances over the subsequent four weeks, the latter three occasions whilst on the LEPA-EKCH leg.
A company formed at Beek during the course of 1961 was Limburg Airways. Their first aircraft, a Dove, was purchased from Keegan Aviation Ltd. (of Transmeridian fame!) and was delivered Southend-Beek as G-ARDN on April 25 with Mr. Keegan in command. The following day the aircraft returned to Southend in the hands of a Mr. Veen, the credited owner, presumably to transport Mr. Keegan back.
Despite the allocation of the Dutch registration PH-VLC, the aircraft continued to operate with its' British reg. under the title Veen's Air Services. 'DN departed for Southend on May 10, returning on the 19th with the incorrect registration PH-VLA applied. A trip to Schiphol on the 23rd obviously cleared up the registration situation as the aircraft was operating as PH-VLC the following day.
The second aircraft was a Heron, acquired from the same source, which arrived at Beek from Stansted on June 22 wearing the registration PH-VLA. Almost a month of inactivity was concluded on July 19 when 'LA departed for Woensdrecht, its' first flight as a Limburg Airways aircraft. 'LC's period of repose exceeded the month, returning to life on July 24 when it too departed to Woensdrecht under Limburg Airways titles.
The company's life was to be short one. 'LA continued regular operations until November 27 when it departed for Le Bourget, sadly never to return. The aircraft was subsequently purchased by Martin's Air Charter. From August on 'LC made but one flight to Le Bourget, the remainder of its' time being spent performing joy flights – some of those being few and far between. The last of these flights took place on November 10 and on December 16 the aircraft departed for Amsterdam as a Martin's machine.

As you no doubt will have noticed, I have in the last two issues of Input levelled a certain amount of criticism at two domestic systems, notably the medical insurance scheme and the obligation to endorse a so called security clearance. The latter needs no further comment save to observe that past events have proven this piece of bureaucratic paperwork to be anything but a security clearance in the true sense!
As regards the medical insurance scheme I feel well qualified to expose some of the inadequacies of the system having suffered the hospitalization of myself, my wife and my daughter all within a period of nine months.
Should the scheme guarantee 80% reimbursement within days of submitting the bills all well and good. But it doesn't! A period of hospitalization could result in your being reimbursed no more than a paltry 50%, and if you should happen to see that inside three months consider yourself one of the chosen few! However, I am assured that this situation is appreciated and that plans are in hand to computerize the reimbursement system, hopefully to the benefit of us all.
The fact that Input is read by our management was highlighted by a recent discovery. A friend had been browsing through magazines in the library when he came across the previous edition of Input with the following comment appended to my letter concerning security clearances. It read, ,,Do we have to take these schoolboys seriously? Do they realise that we could make life for them **really** difficult?'' It subsequently transpired that this annotation had emanated from the pen of a senior member of management, who of course shall remain nameless.
This particular schoolboy would just like to say that contributions for inclusion in Input's pages are always welcomed, but sadly they would seem to have been on the decline in recent times. We can only maintain the present high standard with your cooperation. If written English is your problem why not approach one of the editorial team for assistance. OK, so you wanna know who assisted me!

PJH (Of course!).