Aeropers Rundschau

BEILAGEN: UNFALLBERICHTE: Wasterkingen, CSA, 14.11.1956
München, BEA, 6.2.1958
Tarbolton, BEA, 28.4.1958

Littlewood: Review of the Problem of Midair Collision Prevention

Miles: Thoughts on Take-Off Monitoring

Nr. 54

April 1959

Liebe Mitglieder!

Die Swissair hat einem unserer Mitglieder den Arbeitsvertrag gekündet, da seine Leistungen nicht genügten. Als Copilot auf DC-4 waren die Leistungen noch genügend, aber der Umschulungskurs auf CV wurde nicht bestanden. Da aber der DC-4 aus unserem Streckennetz verschwindet und somit nur noch eine Verwendung als Copilot auf dem DC-3 in Frage kam, war es sicher für den Betroffenen weitaus besser, zur Balair zu wechseln, wo er als Copilot verwendet werden kann und eine Chance hat, um vorwärts zu kommen.

Ich komme hier auf einen Punkt, der früher nicht so ausgeprägt war wie heute. Heute ist es leider aus verschiedenen Gründen nicht mehr möglich, einen an und für sich in seinen Leistungen schwachen Copiloten für sein zukünftiges Upgrading im normalen Streckeneinsatz vorzubereiten, d.h. ihm zu helfen und ihn weiterzubilden. Die verschiedenartigen Einsätze und verschiedenen Captains lassen offenbar eine solche Betreuung nicht mehr zu. Es ist schade, dass individuellere Behandlung nicht mehr durchgeführt werden kann.

Nehmen wir uns aber selber auch an der Nase, denn die einem Copiloten gemäss FOM zukommende Arbeit wird von vielen Captains nicht nach Vorschrift zugeteilt!

Generalversammlung: Die Generalversammlung wird im nächsten Monat durchgeführt werden. Leider war es diesen Monat nicht mehr möglich.

Neuaufnahmen: Der Vorstand hat am 12.März 1959 die folgenden Herren einstimmig in die Aeropers aufgenommen.

Piloten: Lüdi W.
Linggi K.
Kofel A.
Aeschbach H.
Nav.: Leuenberger E.
Brun J.

Mit freundlichen Grüssen:

Der Präsident:

sig. A.Sooder.

VERGEWISSERE DICH VOR DEM START auch über Deinen Leumund und über die Staatsangehörigkeit Deines Copiloten, auf dass Du nicht plötzlich in grosse Funkstille fallest - denn nach Art.7 der an Bord befindlichen Konzessionsurkunde dürfen Bordfunkgeräte nur durch gutbeleumdete Schweizer bedient werden!

IFALPA EXECUTIVE SECRETARY'S ANNUAL REPORT 1958

General:

The Annual Report of the Executive Secretary is probably one of the easiest things to write from the point of view of the abundance of material available but, for that very reason, it is one of the most difficult to present since the year's work of a dozen study groups, the reports of 20 meetings and the growth of the organisation as a whole have to be compressed into a few pages, capable of being dealt with in an hour of Conference time. This account must, therefore, be very broad in its approach and must rely on the documentation of the Conference to fill in the detail.

I feel sure that Member Associations will agree that we can report a year of accelerated progress: new members have applied to join the Federation, our Social studies have taken firm roots, the technical studies have progressed in many directions and an administrative machine has been built up which, but for the continuing nature of the growth, might be regarded as adequate.

Before commenting further on these activities I should like to mention two features of especial significance. The first is the application of the new administrative arrangements laid down at Bogota. These have worked admirably and, in particular, the establishment of a governing body in the form of the Principal Officers (President, Deputy President, Secretary, Treasurer) has been of great benefit; the system of consultation has worked smoothly and has not introduced any unacceptable delays. In this I should like to express my thanks to the Officers for their unfailing help in their individual and also their collective capacities.

The second noteworthy feature has been the help provided by some individual Associations. Quite frankly, the whole programme which successive Conferences have evolved is unworkable in the sense that the number and size of the projects cannot be tackled by any international Secretariat which can be visualised. The solution being attempted (though it is only a partial solution at present) is for individual Associations to espouse particular projects and to be responsible for their entire processing. Thus in the last year ALPA has produced a new salary survey and CALPA has seen the flight time and duty time study through the important (if unrewarding) phase of its ANC discussions at ICAO. It is desired especially to bring these forms of assistance to the attention of members since the growth of work seems likely to outpace the growth of the administrative machine and some such expedient would appear to be the only solution.

It is not, however, only in physical terms that the progress of the Federation should be measured. In terms of its importance to its members and to the outside world development has been no less marked. With regard to the former, even if one judged only by the letters received, it is clear that Member Associations are finding a more intimate connection between their own work and that of the Federation. For example, on the technical side, the introduction of jets has removed any suggestion of remoteness from our fields of study in performance and navigational requirements and, in the social field, the Conditions of Service Summaries are directly related to the day to day bargaining of our members. With regard to the recognition of our importance by the outside world this is illustrated by the fact that direct approaches to a government on the inadequacy of its Air Traffic Control Services were met with courtesy and considerable attention paid to our complaints: this is, I believe, the first time we have conducted anything in the nature of direct discussions at governmental level. Similarly the fact that the one-day IFALPA meeting on Take-off Monitors attracted (on a foggy day) six manufacturers' representatives from abroad is not without significance.

This brings me to a substantial point. At the meeting on Take-off Monitors an unofficial suggestion was made to me by a group of Manufacturers that they would like to subscribe to some form of "IFALPA Technical Associateship", the object being simply to support an organisation which would conduct similar meetings once or twice a year and could answer an occasional question on points of common interest. An indication was given that such an organisation could be self supporting financially. The suggestion is recorded here with the thought that if this is not our next step, it may well be the next but one.

I propose now to deal with our social, technical and administrative activities separately.

Social and Industrial Activities:

1958 was the first year in which we had been able to make a determined attack on our social and industrial programme. Even so, we could not afford to allocate an individual's whole time to the work and hence arrears are reduced rather than eliminated.

It was felt that in tackling any of the projects referred to in Schedule A of the Constitution* the first step must be an examination of the actual conditions of service of our members. To obtain the basic information from contracts, State regulations and other sources and to summarise it in such a form as readily to facilitate comparison, Miss P.Coates has been employed. I feel sure that, when they come to deal with Sub-Committee A items of the Agenda, Member Associations will appreciate fully the study and effort which has been put into this work. Additionally, Miss Coates has been engaged in following up the Bogota Resolution (No.7) on Bulk Insurance Schemes - especially with

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* draft revision

regard to Loss of Licence. Although these two secretarial studies are far from complete, they do, I think, give the Federation a solid basis upon which to build. It is for the Conference to decide what sort of building it wishes to erect.

Breaking somewhat new ground, we have felt it our duty to explore the field of atomic radiation* since there is a fair amount of written evidence to show that the high flying pilot may be exposed to unusual radiation levels and it is clearly necessary to assure ourselves that these are not dangerous levels from a pathological or biological point of view.

In other social fields the Federation has also been active. We have provided advice on suitable contractual provisions to protect the pilot from civil liability claims; furthered our policies on crew complement**, flight time and duty time and interchange; found employment (in a very difficult market) for seven Cuban pilots; and have begun to prepare for the 1960 Conference of the Civil Aviation Section of the ILO.

Technical Activities:

Our efforts in the technical field were, as in the past, governed mainly by the cycle of ICAO meetings and the preparations leading up to them. Although three of the scheduled meetings for 1958 were actually postponed till 1959, it still left a very active year involving the attendance of 40 representatives at 17 meetings. Attendance at these meetings was as follows:***

4th EUM Reginnal Meeting Geneva	Cpt. J.Rivalant	Syndicat National des Pilotes de Ligne
	Cpt.P.E.Bressey	BALPA
	Cpt.E.A.Jackson	Irish Air Line Pilots Association
	Cpt.R.A.Young	ALPA
	Cpt.D.Martin	Foreign Pilots' Association in Swissair
MAP Panel (1st and 2nd Sessions) Montreal	Cpt.A.D.Mills	CALPA
2nd Airworthiness Committee Montreal	Cpt.E.C.Miles	BALPA
	Cpt.H.L.Mouden	ALPA
	Cpt.J.H.Foy	CALPA

* pursued as a joint social and technical study
** pursued as a joint social and technical study
*** as in previous reports, the list is "from Conference to to Conference"and is not confined to 1958

W.M.O.Regional Assn. V. 2nd Session Manila	Cpt. A.I.R.Jose	Air Line Pilots' Assn. of the Philippines
	Cpt.R.Tomacruz	Air Line Pilots' Assn. of the Philippines
ITF 25th Biennial Congress Amsterdam	Cpt.Z.L.Zeyfert	KLM Pilots' Association
	Cpt.J.Bartelski	KLM Pilots' Association
RAC/SAR Divisional Meeting Montreal	Cpt.P.E.Bressey	BALPA
	Cpt.D.Leonard	ALPA
	Cpt.R.I.Hill	BALPA
	F/O S.M.B.Lane	BALPA
3rd European Aeronautical Conference Brussels	Cpt.R.Schreiden	Assn.Belge des Pilotes et Navigateurs de Ligne
	Cpt.F.Jamoulle	Assn.Belge des Pilotes et Navigateurs de Ligne
Vortac Symposium Washington	Cpt.W.M.Masland	ALPA
Convention of the Guild of ATC Officers Southend	F/O S.M.B.Lane	BALPA
	Cpt.R.A.Young	ALPA
COM Special Montreal	Cpt. L.Arthur	BALPA
Italian Air Traffic Control Rome	Cpt.C.C.Jackson	IFALPA
Flight Crew Fatigue Montreal	Cpt.N.J.Logan	CALPA
	Cpt.H.W.Orlady	ALPA
	Cpt.D.Redrup	BALPA
3rd Vertical Separation Panel	Dpt.D.Mason	BALPA
Comet/Decca Domonstrations New York	Cpt.W.M.Masland	ALPA
2nd Session WMO Regional Association IV Washington	Cpt.F.T.Sterling	ALPA
MID/SEA Regional Meeting Rome	Cpt.A.McKenzie	Australian Air Line Pilots' Association
	Cpt.G.Macrae	"
	Cpt.H.Manly	"
	Cpt.J.Rees	"
	Cpt.C.Schrieber	Associazione Nazionale Piloti Aviazione Civile
	Cpt.D.Renzo	"
	Cpt.S.Antonio	"
	Cpt.S.Fabio	"
Special COM/OPS/RAC Meeting on Short Range Navigational Aids Montreal	Cpt.W.M.Masland	ALPA
	Cpt.L.Arthur	BALPA
	Cpt.J.Grisdale	CALPA

For all the above the Federation is greatly indebted to the generous offers of time and effort made by our representatives and by the Study Groups which supported them. On this point, however, it should noted that, in the case of the more specialised subjects, some representatives carried out their assigments with no Study Group support and very little secretarial support. This reflects great credit on the representatives themselves who in all cases carried their work to a successful conclusion. This applies to Captain D.Mason (Vertical Separation Panel), Captain L.Arthur (Special COM), Captain A.D.Mills (Map Panel), Captains A.MacKenzie, G.Macrae, H.Manly and J.Rees (MID/SEA) and Captain W.M.Masland (Special COM/OPS/RAC). Fighting a somewhat similar lone battle, should also be included Captain C.Schrieber, who has been untiring in his efforts in connection with the Viscount Anzio disaster and the associated study of Italian Air Traffic Control.

A further sign of progress has been the preparation of working papers by the Study Group Members. There was a time a year or so ago when it could be said that all IFALPA Working Papers were prepared by the Secretariat. This, we are grateful to record, is now no longer the case (though it still applies to the majority of papers) and thus the Study Groups are slowly becoming more self supporting - the only way in which they can flourish under a system of limiting finance. Incidentally, the production of Working Papers applies to those directed internally to the Federation as well as externally to ICAO: for example, individuals on the Airworthiness Study Group produced 5 follow-up Working Papers (of a very high standard) within a month of their meeting in July.

It is impossible in the short space of this report to mention even the headings of all the technical subjects dealt with during the year. However, undoubtedly our greatest efforts were at the three major ICAO meetings: Second Session of the Airworthiness Committee, Fourth RAC/SAR Divisional Meeting and the Special OPS/RAC/COM Meeting on navigational aids. However, although these meetings drew our greatest effort, it cannot, I fear, be said that all our objectives were attained: as in so many walks of life, some were attained and some were not. For example, in the Airworthiness field, the performance requirements provisionally determined would appear to some degree to be unacceptable (especially the take-off); on the other hand, in the RAC field, we have for the first time seen international recognition of the need for positive control of the air space, at high levels immediately and at the lower levels by progressive stages. This is, indeed, a tremendous if overdue advance. In the field of navigational aids it is, at the time of writing, impossible to tell whether the special COM/OPS/RAC Meeting will come out on the side of an established but inflexible aid or whether it will have the courage to demand an aid of the area coverage, pictorial presentation type as called for by our Athens resolution. In any case it will be some satisfaction for the Conference to know that our policy is being pushed, and pushed hard, by such able men as Captain W.M.Masland, L.Arthur and J.Grisdale. We will have much to thank them for whatever the outcome of the present meeting since our experience goes to show that, in the field of radio aids and communications perhaps more than in any other, the pilot has been more forward in his thinking than has the rest of the industry (airborne radar, ship-to aircraft compatible VHF, HF/RT relay procedures, data transfer, volmet, are typical examples of requirements once denied us as being "impracticable" but now part of airline day to day conversation.)

In connection with accident investigation we are unable, of course, to study every case, and this work must necessarily be left to local associations. Where, however, some feature is apparent which may affect a number of Member Associations, we have always endeavoured to make a special effort. Such was the case of the mid-air collision over Anzio (Italy) in October 1958, as a result of which a special committee is being set up and I myself made a visit to Italy. A similar and more sustained effort has been necessary in the case of the Comet accident in Karachi in 1953. In both these cases it is believed that substantial gains have been made in that the basic cause of the accident has been at least partially recognised by the authorities and remedial action put in handto prevent similar occurrences.

For the processing of much of this work the Federation is indebted to Mr.P.Rider, who joined the staff in July 1958 and is now becoming a very great help in the technical field.

Administration:

The main features of the year in the field of administration has, of course, been the consolidation of all our administrative activities into one office. This was completed by 1st July 1958 and all the principal directives of the Bogota Conference fulfilled. The move, has, of course, very greatly facilitated the work and has enabled a system to be laid down on organic lines, capable of expansion and adaptation as the demands of our ever-changing industry may require. It should be noted, however, that the full benefits have not yet been reaped since the new executive staff engaged were not available for the full year and have, of course, needed some time to acquaint themslves with their job and to assemble their data. Nevertheless, I think that it will be agreed that in volume and in content our product has been high.

Financially, as will be seen from the Treasurer's Report, we have finished a year with a substantial (£ 2,646) excess of income over expenditure, and, although this was largely fortuitous (being mainly accounted for by the postponement of three ICAO meetings), it is naturally a source of satisfaction. It is also a confirmation that our budgetary system is sound and will thus give us confidence to plan ahead.

With regard to these plans, the 1959 budget has been drafted on the basis of growth "at the natural rate" - that is, the steady development of existing projects is allowed for but not the undertaking of new ones. Thus, if new requirements are set forth by the Conference (for example, a translation service, the actual setting up, as distinct from the study, of a loss of licence scheme, the holding of regional conferences), these will have to be provided for by supplementary estimates.

Detailed matters in connection with staff are dealt with in the report of the Principal Officers (59P57) and can be elaborated upon in Sub-Committee F. However, it is thought appropriate here to record the loyalty and enthusiasm of all our staff members - which is reflected in their stability and readiness to meet the demands of the occasion. In this connection perhaps it is not inappropriate to call attention to the fact that, at the executive level, a staff of three hadles the correspondence and performs much of the research of 24 Study Groups or committees - that is an average of eight per staff member. Although comparisons of this nature are inexact, the work of the groups is very similar to corresponding groups in the ILO and ICAO, for the latter of which each executive usually covers only two groups or committees. Moreover, the IFALPA Study Groups (except perhaps in the case of Airworthiness) have not yet achieved the stability which would permit the appointment of a permanent chairman or pilot secretary. This position thus throws a very great proportion of the responsibility as well as the work on to the Secretariat. This is not mentioned here as a complaint by the Secretariat since it is recognised that the situation is partly endemic in the dispersal of our members and the nature of their employment. However, it is a factor which should properly be born in mind in any staff requirements of the future: the secretarial element in the work will always be high and, if it is to achieve its aims, the Federation should be prepared to see a corresponding proportion of its income spent on maintaining a staff adequate in numbers and qualifications.

With regard to these requirements it was found during the past year that the work continued to grow always a little ahead of the staff. Also there have been a great number of organisational problems in connection with the new administration and taking on new staff, which absorbed much of our time but which, hopefully, will not be so demanding in the future. Thus we never really gained the few months we needed, and some material (e.g. manual amendments) left the office six months behind schedule. With this in mind, it was clearly inadvisable to take any additional commitments and hence the project for a News Bulletin was again postponed. On this subject, however, it can be said that, provided that the Conference does not put additional projects in hand calling for my personal attention, the production of a simple double-sided news sheet, edited in a manner suitable for direct incorporation into Association magazines or distributed separately by Associations, should be possible by the middle of 1959.

It will be noted from the report of the Principal Officers that no increase in subscription is being suggested for the year. In this connection, however, I feel that I would be failing in my duty if I did not inform the Conference that, assuming that our present rate of growth continues, a substantial increase in subscription will probably be required in 1960. The reasons for this are, firstly, that over the last year it has been noticable that more Associations and more Study Group members are writing reports and papers; unless we are to reject many of these (and I should require specific guidance on this), they all have to be reproduced. There is no complaint at all about this, and in fact it is a sign of healthy growth. It does mean, however, that the volume of material for processing is no longer dependent mainly on the output of the Secretariat and therefore, at least to some extent, cannot be closely controlled. Additionally projects exist (e.g. interchange, Loss of licence), which could quickly develop into major commitments and, in fact, I should be surprised if one or other of these items does not do so before 1960. Further, the introduction of the News Bulletin will almost certainly generate correspondence from the readers and further accessions to the Study Groups. If such developments do take place, we will have exceeded the limit of "the one project office" and will have to set up two streams of typing, duplicating and despatch, with the attendant increases in staff, machines and other equipment. Small additions would not solve the problem at this stage and probably a change of accomodations would required. For these reasons the warning is given that, if our output of material continues to grow at an ever increasing rate, and if no new source of income is forthcoming (as for example, new membership), a substantial addition to the subscription will almost certainly be required in 1960. It is therefore suggested that, if Member Associations are not prepared to contemplate this, they should at this Conference issue clear directives for keeping the growth in check.

The Future:

Above I have referred to the possibility of setting a limit on our growth. I need hardly explain that this is not my wish. There are, however, other cogent reasons why our present courses should be pursued and I should like to conclude this report with reference to them.

In the early days of trade unions the struggle was mainly a bread and butter struggle and while this dominated the movement there was no opportunity to look beyond it. However, those days are probably over in the case of most fields of employment; they are certainly over in the case of the airline pilot, and hence his trade union movement has an opportunity to look beyond the day economic requirements.of its members. The question is, where shall we look?

This is by no means an original thought. Some years ago George Meany, now President of the AFL/CIO, recorded the same point when surveying the American labour field. He answered the quesion by saying that now that the bread and butter phase of trade unionism was over, it should set itself a "social" purpose, and by that he meant that it should aim at actively contributing to society as well as to its own members.

What trade union organisation has a better opportunity to contribute to society than has an international federation of air line pilots in the field of air safety? It is my hope that, whatever new calls there may be on our resources, we maintain and develop this programme and, in so doing, give a new lead to the social movements of our age.

sig. C.C.Jackson

Executive Secretary.

UNFALL EINER VISCOUNT VOR DEM FLUGHAFEN GATWICK

Die am 17.Februar 1959 beim Anflug auf den Flughafen Gatwick abgestürzte Viscount 794 der Turkish National Airline hatte 5,5 km vor der Landeschwelle der Piste 08 an einer Stelle Bodenberührung bekommen, an der das Flugzeug noch eine Höhe von ca. 300 m über Flughafenbezugspunkt hätte aufweisen müssen. Die Unfallstelle selbst befindet sich ca. 80 m über dem Bezugspunkt. Das Flugzeug führte einen normalen ILS-Anflug bei 1,8 km Horizontalsicht und 1/8 Bedeckung in 240 m durch. Eine zusätzliche GCA-Führung hat nicht stattgefunden, jedoch soll der Anflug auf dem Radarschirm überwacht worden sein.

Verschiedene Betrachtungen gehen davon aus, dass ähnlich wie bei dem Unfall einer Electra in der Nähe des Flughafens La Guardia und dem einer Viscount beim Anflug auf den Flughafen Benina bei der Uebermittlung der Angaben über Flughöhe Fehler unterlaufen sind. Gründe dafür können in der falschen Uebermittlung barometrischer Druckangaben oder in der Ablesung bzw. dem Nichtfunktionieren der Höhenmesser zu finden sein. In der Electra waren neue Höhenmesser installiert, die nun aufgrund des Unfalls wieder durch die bisherigen Geräte ersetzt wurden.

(THE AEROPLANE, 27.2.1959)

WAS HEISST "SICHTKONTAKT" ?

(Aus dem Unfalluntersuchungsbericht G-AICS, Chorley, 27.2.1958)

...

Im vorliegenden Fall war eine Bewilligung zum Fliegen auf "1500 ft remaining contact" erteilt worden. Diese Bewilligung war als Bewilligung unter den "besonderen Sichtflugregeln" gemeint und wurde auch so aufgefasst - als Bewilligung zum Fliegen unter Wetterbedingungen, die den ordentlichen VFR-Bedingungen nicht entsprachen, unter zwei Bedingungen: dass eine Flughöhe von 1500 ft/M und ständig "Sichtkontakt" gehalten würde.

Was heisst nun "Sichtkontakt"? In der vorliegenden Untersuchung wurden soviele Meinungen geäussert, wie Personen befragt wurden. Das ist natürlich ein unhaltbarer Zustand. Die Vorschriften und Richtlinien enthalten keine nähere Umschreibung. Es handelt sich meines Erachtens um einen Ausdruck, der sich mehr oder weniger unvermerkt eingeschlichen hat und in der Sprache der Verkehrsleitstellen üblich geworden ist, ohne dass sich jemand irgendwann darüber klar zu werden versucht hat, was wirklich darunter verstanden werden soll. Sein Ursprung liegt in den U.S.A., wo er vielleicht eine festumschriebene Bedeutung hat; in der Uebernahme in unser Land hat er diese allgemein anerkannte Bedeutung verloren oder nie erhalten.

Einige Beispiele mögen zeigen, was verschiedene Zeugen Verschiedenes darunter verstanden haben. Cpt.Evans hielt dafür, es heisse "andauernd und uneingeschränkt in Sicht auf Land oder Wasser verbleiben", obwohl er dann zugab, dass ein oder zwei Zehntel Wolken unter dem Flugzeug nichts ausmachen würden; ferner meinte er, das Wesentliche liege darin, dass man seinen Standort immer nach Bodenbeobachtungen bestimmen könne. Cpt. Skemp äusserte sich, dass man "durch Sichtbezug auf Boden oder Wasser müsse navigieren können", und dass einige Sekunden Wolkenflug dabei zulässig seien, wobei die Dauer dieses Unterbruchs von den konkreten Umgebungsverhältnissen abhängen würde. Mr. Whaley glaubte, dass der Pilot nicht notwendigerweise jederzeit volle Bodensicht haben müsse, sondern einfach jederzeit seine Stellung im Verhältnis zum Boden müsse halten können. Mr.Howarth äusserte sich wie folgt: "... mit Bodensicht, aber nicht unbedingt ununterbrochen. Wenn ein Flugzeug über einer Wolkendecke mit vielen Sichtlöchern fliegt, so kann immer noch Sichtkontakt gegeben sein. Er sieht ja den Boden. Es ist eine Frage des Masses - wie gross die Wolkenlöcher sind." Als ihm entgegengehalten wurde, dass das Unfallflugzeug ohne Sichtkontakt flog, gab er eine überraschende Antwort, die deutlich zeigt, welche Gefahren mit dem gegenwärtigen Begriff der "Kontakt"-Bewilligung verbunden sind: "Doch, wir flogen mit Sichtkontakt, denn Sicht voraus muss damit nicht verbunden sein!" Cpt.Cairnes sagte, dass man Sicht auf Boden oder Wasser haben müsse, dass man Hindernisse vermeiden können müsse".

Es gibt also Leute, die mit Kontakt die Fähigkeit zur Navigation nach Bodenpunkten, andere, die damit die Fähigkeit zur jederzeitigen Standortbestimmung nach Bodensichtpunkten verbinden, wieder andere, die nur - in verschiedenem Ausmass - die Möglichkeit verlangen, den Boden zu sehen. Nebenbei möchte ich bemerken, dass Cpt.Cairnes anscheinend seinen Standort beim Ueberflug von Chorley, als er schon weitab von seinem Kurs flog, im Verhältnis zum Boden nicht kannte, obwohl er in diesem Zeitpunkt immer noch dafür hielt, mit Sichtkontakt zu fliegen.

Meines Erachtens wäre ein Begriff "Sichtkontakt", der vom Piloten nur verlangt, dass er in nicht näher bestimmtem Umfang auf den Boden sieht, nicht nur sehr vag, sondern in vielen Fällen eine überflüssige Bedingung einer Bewilligung. Es nützt dem Piloten nichts, unter sich den Boden zu sehen, wenn er im Begriff steht, in eine Wolkenbank einzufliegen, hinter der ein Bergzug liegt. Mit derartigem "Sichtkontakt" kann er seinen Standort nicht jederzeit bestimmen. Von Navigationsmöglichkeit kann unter solchen Voraussetzungen nicht gesprochen werden, wenn nicht genügende Sicht voraus gegeben ist. Meines Erachtens muss ausser jedem Zweifel stehen, dass eine Bewilligung zum Fliegen "mit Sichtkontakt" die Bedingung gegenwärtiger und andauernder genügender Sicht voraus in sich schliesst.

...

Es wäre aber überhaupt wünschbar, wenn das Ministerium die ganze Frage der "Special VFR Clearances" neu überprüfen würde, um dabei klarzustellen, dass eine solche Bewilligung niemals von den Verkehrsleitern von sich aus angeboten werden sollte, sondern nur auf ausdrückliches Verlangen der Piloten, wenn dabei die Verkehrstrennung genügend gewährleistet ist...

NICHT NUR JETS fressen Abfälle, wie der folgende Bericht eines Verkehrspiloten zeigt: "Vor kurzer Zeit führte ich einen Flug aus, auf welchem sich das Flugdeck plötzlich mit Rauch füllte, der dann so dick wurde, dass wir die Sauerstoffmasken anziehen mussten. Die Rauchbildung hörte schliesslich auf, als wir die Kabinenheizung ausschalteten. Die nachherige Kontrolle förderte die angebrannte Verpackung einer Whiskey-Flasche in einer Ansaugleitung zutage!

(FSF APB 58-12, 15.12.1958)

MENSCH UND MASCHINE

Der Mensch übertrifft die heutige Maschine in der Fähigkeit,

- kleinste Beträge optischer oder akustischer Energie zu registrieren,
- optische und akustische Formen zu erkennen und auszulegen,
- den Umständen angepasste Verfahrensweisen zu improvisieren und anzuwenden,
- erhebliche Informationsmengen langfristig aufzuspeichern und sich wesentlicher Umstände zu richtiger Zeit zu erinnern,
- induktiv zu überlegen,
- abgewogene Urteile zu fällen.

Die Maschine übertrifft den (heutigen) Menschen in der Fähigkeit,

- sofort auf Signale zu reagieren,
- grosse Kräfte geschmeidig und genau anzuwenden,
- routinemässig wiederholte Aufgaben zuverlässig zu lösen,
- Information kurzfristig aufzuspeichern und vollständig wieder auszulöschen,
- Information deduktiv auszuwerten (auch in Form komplizierter Berechnungen),
- sehr komplizierte Anlagen mit gleichzeitig vielfacher Aufgabestellung zu steuern.

(FSF 58-5H)

CHARLIE RUSHING +

Cpt.Charlie Rushing, der vor einiger Zeit als Pilot bei der Swissair tätig gewesen war, kam als Bordkommandant des Convair-Liners der Air Jordan, der am 22.Januar 1959 bei Jerusalem abstürzte, mit den übrigen drei Besatzungsmitgliedern und mit fünf Fluggästen ums Leben. Ehre seinem Andenken!

ABBRUCH DER AUSSPERRUNG BEIM SAS

Der Arbeitskonflikt bei der skandinavischen Flugverkehrsgesellschaft SAS, der drei Wochen gedauert hat, konnte am 24.März endgültig beigelegt werden. Nach zwölfstündigen Verhandlungen unter der Regie der Vermittlungskommission wurde vom SAS und von der "Skandinavischen Flugpersonalvereinigung", der in der Hauptsache die schwedischen Piloten, Flugtechniker und Navigatoren oder total 650 Mann angehören, ein Abkommen unterzeichnet. Dieses entspricht mit wenigen Ergänzungen im wesentlichen dem ursprünglichen Vermittlungsvorschlag, den das SAS sowie die dänischen und norwegischen Piloten schon am 28.Februar akzeptiert hatten. Danach wird die besonders umstrittene Kontingentierungsfrage bezüglich der Beförderung der Piloten der drei beteiligten Länder und des Dienstes auf den Düsenflugzeugen einem Schiedsgericht zur Entscheidung unterstellt, das sich aus drei angesehenen schwedischen Richtern zusammensetzt.

Der schwedisch beherrschte Personalverband hatte sich schon am Montagabend grundsätzlich zur Annahme des Vermittlungsvorschlags bereit erklärt. In der Nacht auf den Dienstag ergaben sich jedoch neue Komplikationen in bezug auf die "Kapitulationsbedingungen" für die schwedischen Piloten. Schliesslich kam man unter anderem dahin überein, dass die Flugteckniker, die die Blockade brachen und mit deren Hilfe der Verkehr in letzter Zeit etwa zur Hälfte aufrechterhalten werden konnte, sobald als möglich aus dem Flugdienst wieder entlassen werden. Ferner brauchen Mitglieder des bisher ausgesperrten Verbandes künftig nicht zusammen mit Blockadebrechern zu fliegen. Weiter sollen die Piloten für die neuen "Caravelle"-Maschinen wie bisher nach dem Dienstalter ausgewählt werden. Sämtliche schwedischen Piloten erhalten ihr Gehalt rückwirkend ab 23.März.

Mit ihrer bei der Bevölkerung äusserst unpopulären Aktion haben somit die schwedischen Piloten, seitdem sie am 1.März den Vermittlungsvorschlag ablehnten und damit den Konflikt vom Zaun rissen, in den hauptsächlichsten Streitfragen so gut wie nichts erreicht. Die Gesellschaft aber hat inzwischen über 6 Millionen Kronen verloren und beim fliegenden Publikum einen Verlust an Goodwill erlitten, der, wie man befürchtet, nicht so leicht wieder wettzumachen ist. Man rechnet indessen damit, dass der Verkehr mit einigen wenigen Ausnahmen auf dem ganzen Flugnetzt des SAS, also auch auf den transatlantischen Linien, bis zum 1.April wieder im Gang sein wird. Die infolge der Verkehrseinschränkungen entlassenen 1300 Angestellten und Arbeiter der Gesellschaft verlangen heute ihre sofortige Wiedereinstellung.

(NZZ, 25.3.1959)

1956 24.11.	Wasterkingen, Schweiz	CSA	Il-12 OK-DBP
EUK Nr.44/10.3.1959			

Unfall: Das Flugzeug stand mit einer fünfköpfigen Besatzung auf der Linie Prag-Zürich-Prag im Dienst. Nach etwas verspäteter Landung in Zürich und nach normaler Bereitstellung wurde 1700 GMT das Triebwerk laufen gelassen, wobei der linke Motor nur mühsam und mit auffallenden Knall- und Feuererscheinungen ansprang. Um 1716 startete es auf der Piste 34 mit 18 Fluggästen an Bord. Beim Abheben wurden von verschiedenen Zeugen vorübergehende Knallerscheinungen festgestellt. 1717 meldete das Flugzeug Steigflug auf 7000 ft und Ueberflug des Funkfeuers Trasadingen voraussichtlich um 1723. Das war die letzte Meldung. Etwas später bemerkten Augenzeugen das Flugzeug auf geringerer als normaler Flughöhe, etwa auf 300-500 m/G, etwa 1.5 km rechts der Ausflugachse mit unregelmässigem Triebwerklauf und mit Branderscheinungen an der rechten Motorgondel; dann leitete es eine Linkskurve ein, und nach etwa 90 Grad - etwa 1720 - kippte es nach rechts und stürzte mit einer Neigung von 30-60 Grad zu Boden, etwa 14 km NNW vom Pistenende 34 entfernt. Das Flugzeug wurde vollständig zerstört; alle Insassen kamen ums Leben. - Der Untersuchung gelang es nicht, die Primärursache zu erstellen. Das schlechte Anlaufen des Motors war wahrscheinlich auf ein anfänglich schlechtes Gemisch zurückzuführen; ein Zusammenhang mit dem Unfall war nicht nachzuweisen. Der Wählerhahn der Feuerlöschanlage wurde in einer Zwischenstellung aufgefunden, bei welcher das Feuerlöschgemisch auf beide Motoren strömen konnte; es erschien daher möglich, dass dadurch in einem kritischen Stadium auch die Leistung des linken Motors beeinträchtigt wurde.

Ursache: Geschwindigkeitsverlust in kritischer Fluglage nach Brandausbruch und Ausfall des rechten Motors, möglicherweise mitverursacht durch Leistungsabfall des linken Motors zufolge Einwirkung des Feuerlöschgemischs.

1958 6.2.	München-Riem	BEA	AS-57 G-ALZU
MTCA GAP 153/31.1.1959 (LB)			

Unfall: Das Flugzeug (Hochdecker Airspeed Ambassador Elizabethan) nahm im Rückflug von einem Sonderflug Manchester-Belgrad um 1417 Z auf dem Flughafen München die vorgesehene technische Zwischenlandung vor. An Bord befanden sich ausser der sechsköpfigen Besatzung 38 Fluggäste (darunter die Fussballmannschaft "Manchester United"). Das Wetter in München war gekennzeichnet durch leichten Wind aus WNW, Bodensicht von 1.6 NM, leichten bis mässigen Schneefall, geschlossene Wolkendecke auf 600 ft, Temperatur 0°. Zwei Starts um 1530 und 1535 wurden wegen Ladedruckschwankungen abgebrochen; die Besatzung liess sich aber durch einen Hinweis des Stationsmechaniker auf die Flughafenhöhe (528 m/M) beruhigen und führte das Flugzeug 1603 in den dritten Start auf Piste 25. Das Flugzeug durchrollte die ganze Pistenlänge von 1908 m sowie die anschliessende Sicherheitsstrecke von 25 m, durchbrach die Flughafenumzäunung, übersprang eine Nebenstrasse, streifte ein Haus, wobei die linke Tragfläche und Leitwerkteile abgerissen wurden, und prallte nach weiteren 100 m gegen eine Holzbaracke, wobei der Rumpf losgerissen und in Brand gesetzt wurde; der Rest! blieb nach weiteren 70 m liegen. 21 Insassen wurden sofort getötet, zwei andere starben später im Krankenhaus; der Rest! kam mit mehr oder weniger schweren Verletzungen davon. - In der letzten Phase hatte der Copilot noch einen Bremsversuch unternommen, während der Kommandant im Gegenteil die Leistungshebel noch weiter nach vorn zu schieben versucht hatte. - Für Triebwerkmängel ergaben sich keine Anhaltspunkte. Mit hoher Wahrscheinlichkeit konnte die Ursache in einer Vereisung der Tragflächen erstellt werden, während die Erhöhung des Reibungswiderstandes durch Schnee und die Beeinträchtigung der Laufradgängigkeit durch Schneematsch nicht als wesentlich bezeichnet wurde.

Ursache: Verlängerung der Startrollstrecke über die Pistenlänge hinaus durch Erhöhung der Abhebegeschwindigkeit und Verringerung der Beschleunigung zufolge Vereisung der Tragflächen.

1958 28.4.	Tarbolton, Ayrshire	BEA	V-802 G-AORC
MTCA CAP 154/CAR C.679/27.1.1959			

Unfall: Das Flugzeug startete 2042 GMT in London zum Ueberflug nach Prestwick, um dort nach London bestimmte Fluggäste aufzunehmen. An Bord befand sich eine fünfköpfige Besatzung. Der Ueberflug ging auf 18500 ft routinemässig vor sich. Kurz vor 2153 erhielt das Flugzeug von der Verkehrsleitstelle Scottish Airways die Bewilligung zum Absinken auf 8500 ft und die Wettermeldung von 2150, die zeigte, dass die Situation in Prestwick gerade unterhalb der BEA-Minima lag. Der Kommandant meldete seine Absicht, mit ILS auf Piste 21 bis auf die Minima hinunter anzufliegen und dann den endgültigen Entscheid zu treffen. 2156 erhielt er Bewilligung zum Absinken auf 4000 ft, und um 2157 meldete er 1300 ft im Sinkflug, dann wechselte er auf die Anflugleitstelle Prestwick, meldete 11000 ft im Sinkflug und erhielt QFE und QNH für den Flugplatz, worauf die Höhenmesser eingestellt wurden. Kurz nach 2203 meldete der Kommandant Höhe 14500 ft, nach einem Blick auf den immer noch auf Zonen-QNH eingestellten Höhenmesser des Copiloten, den er mit 14300 ft abgelesen hatte. Der GCA-Leiter antwortete: "YOU ARE TOO HIGH FOR ME AT THE MOMENT - I'LL TAKE YOU FROM THE HOLDING PATTERN WHEN YOU REACH THE BEACON." Um 2205 meldete der Kommandant 12500 ft und leitete die normale Sinkflugrunde ein. 2207 meldete er "JUST ELEVEN DESCENDING", und kurz darauf prallte das Flugzeug auf einer Höhe von 4500 ft/M neben den Funktürmen drei Meilen nordöstlich der Pistenschwelle 21 auf den Boden. Es rutschte über eine Strecke von 400 yds weiter, blieb dann liegen und brannte aus. Drei Besatzungsmitglieder wurden schwer verletzt, zwei leicht verletzt. - Der Kommandant hatte eine Erfahrung von 10136 Flugstunden, wovon 9000 als Kommandant und 766 auf Viscount 802; der Copilot eine solche von 5260 Stunden, wovon 544 auf Viscount 802; sie waren noch nie als Besatzung zusammen geflogen. - Die Untersuchung führte auf keine Mängel am Flugzeug und insbesondere auch auf keine Mängel an den beiden Dreizeiger-Höhenmessern.

Ursache: Fehlablesung der Höhenmesser um 10000 ft, ermöglicht durch ungenügende Kontrolle und Arbeitsteilung zwischen Kommandant und Copilot.

REVIEW OF THE PROBLEM OF MID-AIR COLLISION PREVENTION

Presented at the Sixth Annual ALPA Air Safety Forum, March 1958
By William Littlewood.

I welcome the opportunity to participate with the Mid-Air Collision Prevention Panel in my capacity as chairman of the ATA airline coordinating committee known as the PWI/CAS Committee, which in plainer language means Proximity Warning Indicator - Collision Avoidance System Committee. Our function as a committee is to encourage developments, evaluate results, and ultimately promote action leading to the earliest possible aircraft installations of practical collision prevention devices. We consider this need essential and supplementary to the long range development and application of precise air traffic control methods, which work, as you know, is being actively pursued under the leadershipf of the Airways Modernization Board.

My brief remarks today will concern themselves primarily with a history of the collision prevention activity and an assessment of the situation as it now stands. Historically, I like to go back to 1946 as a starting point in the serious contemplation of the aircraft collision prevention problem. At that time the Airborne Instrument Laboratories (AIL) of Mineola, Long Island, were being temporarily managed by one of the airlines in order to preserve its organzation and function in consideration of the invaluable work it had performed during the war (and since) in the development of electronic equipment and techniques. There was suggested to the AIL staff a project to study the problem of mid-air collisions and evaluate the possiblities of its early solution by the application of reasonably available electronic techniques. An excellent study and report were prepared by Dr.William Close, which continues to serve as an accurate, fundamental analysis of the problem, but which unfortunately led to the conclusion that within the then state-of-the-art and in the reasonably foreseeable future, there was litte hope of solving the problem by electronic principles.

The study disclosed, as we all know, that the simple mathematical analysis of the problem was that two airplanes are on a collision course if their relative bearing angle is constant. This principle is the one which is so commonly applied visually in creating relative angular motion to avoid collision. Another way to state the mathematical law of collision is that two airplanes are on a collision course if the rate of change of distance separation is constant. The conclusions inevitably reached from these two statements of the principle are that avoidance systems must determine and act on changes of relative bearing angle, or changes of rates of distance separation. Such determination must be made from a relatively unstable and moving platform in turbulent air and must deal with minute changes of angle or rates of change of distance at substantial distances of separation. These required distances of separation, as determined on a minimum required time for reaction and action basis, continually increase with increasing relative speeds of closing.

Since apparently nothing could be done about this rather intricate problem in the then state of the electronic art, no substantial action was taken until the summer of 1954 when at a Conference of the Vice Presidents of Operations of the airlines, a committee was formed to again review the air collision problem and make recommendations for action, and to prepare an analysis of possible electronic systems for collision avoidance to stimulate interest among government and civilian laboratories and manufacturers.

In April 1955, at the Spring Assembly Meeting of the RTCA (with the IRE), the committee report was presented and adopted, and within the month 600 to 700 copies of the analysis and requirements specifications were released at home and abroad to all believed to be interested. The response was very discouraging, but by the fall of 1955 detailed discussions were under way with about 10 manufacturers.

In the spring of 1956, Bendix Radio released its detailed study entitled "Fundamental Physics of the Air Collision Problem" which contained the following discouraging statement, "A self-contained air collision prevention system is now, and will continue to be, out of the question." The words "self-contained" in this statement refer, of course, to an equipment which when installed in an aircraft functions to give that aircraft collision protection with respect to all other aircraft. The antithesis of this is, of course, the cooperating principle which requires two aircraft and their equipments to function jointly in order to provide the information necessary for collision avoidance. The principal emphasis had been places, and continues, on the development of self-contained collision prevention equipment on the basis that protection is provided as rapidly as, and in proportion to, the number of such equipments installed in individual aircraft. Any effective collision prevention obtained with cooperative equipment necessitates a very extensive, and ultimately complete, equipment of all aircraft mutually concerned. Cooperative devices are presumed to be technically simpler and more readily available , but the benefits may be substantially inferior with resprct to the time of accomplishment. The specifications then and now, however, do not close the door to dooperative equipments but continue to emphasize the desirability and hope for self-sufficient devices.

Following the Bendix analysis and report the airlines continued to press for more promising replies. And, it was late in June of 1956 that the Grand Canyon collision occurred to focus emphatic attention on the problem. The present PWI/CAS Committee was formed at that time and intensive efforts have been made ever since. The previous statements of requirements were reviewed and re-submitted to all who had indicated any interest whatsoever. There was also conceived and emphasized the PWI or proximity warning indicator concept with the hope that a simple device denoting only intrusion of an aircraft within a protective envelope and serving as an alerting device would be of sole benefit and might be available substantially in advance of the more complex collision avoidance system. The PWI was conceived as denoting relative azimuth and elevationof the intruding airplane within a reasonably assumed protective envelope of space. It was realized that such protection would only be effective for relatively slow rates of closure and principally under conditions of good visibility, but these were the conditions which had characterized a majority of the accidents, including the Grand Canyon. It appeared at that time that the development of a full collision avoidance system would require at least three years and it was hoped that a PWI device could be available within a year.

In August, 1956 Collins Radio made a firm proposal do develop a PWI device of the radar type, expected to be available for trial within a period of months. To this they proposed to later add a CAS computer working on the Doppler principle, hopefully within about two years. Without question, the proposal was made in good faith and by December 1956 some $ 2,000,000 in orders had been accepted by Collins and additional orders several times as great were under negotiation. Meanwhile, Collins had been intensively studying the ways and means by which they expected to implement their commitments and unfortunately in January, 1957 they asked to be relieved of contract responsiblities because of technical difficulties and limitations.

During that same month Hughes Aircraft Company completed its study and released its conclusions that "We do not consider the development of a self-contained CAS practical within the present state of the art." Hughes advised that they proposed to concentrate their efforts on improving the air traffic control system, the ultimate success of which we all recognize as a very great contribution toward collision prevention, but not the complete answer.

Therefore, the Committee continued its search for ways and means of solving the PWI/CAS problem. Late in April, 1957 a meeting was held in Washington attended by over 200 engineers and representatives of 69 manufacturers and all the interested agencies. The meeting was devoted largely to a detailed examination of the possibilities of infra red, initially as an approach to the PWI problem. In July, 1957 another large meeting was held in Los Angeles attended by some 170 representatives of 48 organizations. At that time Aerojet-General proposed an infra red PWI system. Other proposals less definite were made by RCA, Aviation Instruments Manufacturing Corp. and Raytheon. The PWI/CAS Committee visited Aerojet-General's laboratories and were much impressed with its accomplishments in the infra red field in other applications. On the basis of its definite proposal, it was agreed that Aerojet-General would develop and install an infra red PWI system in its company DC-3 and if satisfactory demonstrations of that equipment were made, four airlines (Pan American, American, TWA and United) agreed to install and test such equipments in airline aircraft. The airplanes proposed to be used included Constellations, Convairs, DC-6's and DC-7's. It was also suggested that if this project preceeded satisfactorily, the Boeing Company might be willing to make a trial installation in the B-707 prototype.

It was hoped that the equipment for airline trial would be available by January, 1958.

In September, 1957 antoher PWI/CAS meeting was held in Los Angeles to review additional information, discussions and proposals from manufacturers. Further presentations were made by Aerojet-General, RCA and Stanford Research Institute. In January of this year another meeting was held in Los Angeles with the hope of witnessing the DC-3 Aerojet-General infra red trials. The equipment was not ready for such demonstration, however, and the meeting attended by 97 representatives from 45 organizations, was devoted to discussions and presentations from Minneapolis-Honeywell, Packard Bell, I.T.& T. and others.

The initial development of the Aerojet-General infra red system continues and it is now hoped that there will be an early demonstration of its value as a prosimity warning indicator.

In closing, I would like to emphasize that this effort has been undertaken in full cooperation with the Air Force through WADC and has received excellent support in the form of analyses and studies from the aircraft manufacturers and from the government agencies and manufacturers of infra red and electronic equipment. The problem is very difficult. Even the PWI, which does not involve the further refinements of detection, discrimination, notification and instruction characteristics of the ultimate CAS system, but only performs the simple alerting function, is extremely complex particularly on the self-sufficient basis. Throughout the program the enthusiasm and activity have been very great and the cooperation of all parties has been excellent. The program will continue and we hope for early and encouraging indications of success.

THOUGHTS ON TAKE-OFF MONITORING ARISING FROM THE JOINT IFALPA/INDUSTRY MEETING, 4th December 1958.

The thoughts expressed in this paper are those of the Chairman of the Meeting, Captain E.C.Miles. They should not be considered as an expression of IFALPA opinion or policies.

1. INTRODUCTION

The case for Take-off Monitoring has been sufficiently made out. The case has been made by the Military, by the Monitor manufacturers, by Airline Pilots, and by Airworthiness experts. This paper attempts to discover the best way to use the Monitors in Civil Aviation.

2. TAKE-OFF MONITORS AND THE PERFORMANCE REGULATIONS

It is first necessary to discuss the take-off requirements with which civil aeroplanes must comply. These requirements are designed to ensure safety in two distinct circumstances; one where all the engines are operating and the other where one engine fails completely at the decision speed. It was at one time thought that aking care of the one-engine inoperative case would ensure that the all-engine operating take-off would be safe. But, although one-engine inoperative lengths will be longer, all other things being equal, all other things are not equal. Because complete engine failure at the decision point is rare, the aeroplane will be exposed to the risk rarely. However, performance with all engines operating will frequently be below that achieved with all engines operating during certification tests and the aeroplane will be exposed to this risk daily. Day to day variations in such influences as, for example, assumed passenger weights and profile drag, which are not treated as operational parameters, can thus lead to longer take-off lengths with all engines operating than those achieved with one engine made inoprative at the most critical point during certification tests.

The performance requirements are based on an accepted risk. From this risk is calculated the margin. The risk may, for example, be of an incident 1 in 100.000 take-offs. Now, what does this mean as far as aeroplane performance is concerned? The aeroplane during certification tests achieves a certain level of performance with all engines operating, e.g. it becomes airborne in a certain horizontal distance, it reaches a height of 35 feet in a certain horizontal distance. These distances are then increased by a factor dictated by the design-incident probability accepted. The take-off lengths for any weight then are:

1. The certificated all engines operating lengths times a factor, e.g., 1.15, 1.18.
2. The certificated lengths with one engine made inoperative at the decision point.

Take-off will then be permitted at the weight at which the longer of these two lengths equals the take-off length available. The assumption then is that only once in 100,000 times - or such other figure as is inherent in the design-incident probability - will the aeroplane exceed these lengths.

Without take-off monitoring, the pilto is acting on faith from the moment he opens the throttles. He has calculated his weight; the Flight Manual data implies that he is safe and that is the end of it. Of course, early enough in the run, if he has sufficient indication of lack of performance from engine instruments or external reference, he can abort the take-off. But, otherwise, he doesn't know whether he is doing better than the certificated lengths or worse than those lengths, or even if he is inside the factor which has been applied. Take-off monitoring will provide the pilot with an indication of how the take-off is progressing. In other words, the pilot will no longer be relying on faith - he will have an indication of how far his faith is justified.

The first thing, then, that take-off monitoring should provide is a measure of the individual aeroplane performance and it should provide it at a point sufficiently early in the flight to prevent incident.

3. TAKE-OFF MONITORING ON "CRITICAL RUNWAYS"

Let us examine this monitoring information as it affects continued take-off when the aeroplane is at the maximum weight permitted for the take-off lengths available. Let us see how this affects firstly, the all-engines operating case, and secondly, the one engine operating case.

3.1 All engines operating

In the all engines operating case the fact that take-off monitoring provides a measurement of achieved performance, might lead one to the conclusion that take-off performance, accurately monitored, could become an operational parameter and that the margin could therefore be removed. This might be true if the monitoring were applicable to the whole of the take-off and if flight could safely be discontinued at any time during take-off. However, the take-off can be discontinued only up to the last safe stopping point. Moreover, the performance measured is that currently being achieved and that achieved in the past. Take-off monitors cannot forecast performance. Those which compute future performance merely extrapolate the performance currently being achieved. Thus it is only the achieved performance up to the last safe stopping point that is of major interest at the moment. This fact is of great importance, since appreciable variations in performance (90 % of the total take-off variations has been suggested in some quarters) occur after the decision point. In other words, even if achieved performance is 100% of the Flight Manual performance up to the decision point, we are still dependent on the margins, based on the analysis of the statistical variables, to ensure the required level of safety after passing the decision point and this leads to the conclusion that continued take-off with anything less than 100% of the assumed performance up to the decision point may result in an unacceptable level of safety. This, if achieved performance as indicated by the monitor is less than 100%, the take-off must be aborted.

Further studies of the subject may possibly enable this requirement to be changed. For example, if it can be established that certain variations show up only before the decision point, then they might be related to a margin applied to one stage of the take-off, and those variations applicable to flight after the decision point applied to a second stage.

However, until such studies are undertaken, the take-off must be aborted if achieved performance is less than 100% of certificated performance.

3.2 One-engine inoperative

Let us now examine the information provided by take-off monitors as it affects the engine-out case.

No factors* are applied at present to the one-engine inoperative case. If the aeroplane is achieving 100% of its calculated performance up to the decision point and then suffers a complete failure of the most critical engine, it will comply with the one-engine inoperative requirements. That is, the take-off lengths required will equal the take-off lengths available. Clearly, if the achieved performance up to the decision point is less than 100%, the aeroplane will not meet these requirements.

What is the present situation when an aeroplane is down on performance to any extent before it suffers complete failure of one engine at the decision point? The assumption is that since complete engine failure at the most critical point during take-off is rare, its incidence, coupled with adverse statistical variables, is less than the design-incident probability accepted. Thus, the

* There is in fact a small delay factor built in to allow for the time required to recognise engine failure to the time of first effective deceleration but this factor is, in practice, normally consumed and therefore does not amount to a true margin.

probability of complete failure of one engine, coupled with adverse statistical variables is within the accepted risk. So that when the combination does arise, since the lengths are not factored, we know that there is bound to be an incident.

Where there is only a runway available and no stopway or clearway is taken into account, this is not too bad. Assuming continued take-off, the requirement gives a height of 35 feet or 50 feet at the end of the runway, and the pilot might cross this at only 5 feet during an incident, but he crosses it. Looking at it from another angle, the height of 35 feet or 50 feet can be converted into further ground roll along the concrete and thus the case of continued take-off from failure at the decision point, an added safety factor capable of providing a margin to prevent an incident becoming an accident.

The new requirements for turbine-powered aircraft provide a margin in the form of ground roll. They require that, where maximum credit is taken for any stopway or clearway that may be available, one half of the horizontal distance from unstick to the height of 35 feet (at which V_2 must be attained) shall be runway. This can be expressed as a height of 10 feet at the end of the runway. It will thus be seen that the margin has been much reduced (from 35 ft. or 50 ft. to 10 ft.). With the safety margin reduced to this figure it would seem, in the continued take-off case, that there would be every likelihood of an incident becoming an accident, in that the pilot might well be continuing his ground roll on the stopway or clearway.*

Reference has already been made to the fact that, even if there is 100% performance up to the decision point, appreciable day-to-day variations subsequent to the decision point may occur. If there is also complete failure of one engine at the decision point, the aeroplane will have an incident. In the case of continued take-off it will be eating into its height margin at the end of the take-off. Clearly, then, in the engine-out case, as well as in the all-engine operating case, if achieved performance up to the decision point is less than 100%, the take-off must be aborted.

Summing up the one-engine inoperative case, we can say that:

1) Only with 100% performance up to the decision point can we expect compliance with the one-engine inoperative requirement. Anything less than 100% is unacceptable.

2) Even with 100% performance there will be an incident if complete failure of the critical engine coincidences with adverse day-to-day variations effective over the decision point.

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* It is true that some experience has been gained with zero feet at the end of the runway where stopway or clearway was available, but the experience gained on critical length runways is, it is submitted, too small to justify such lack of margin for world-wide use.

We have seen that the assurance that performance up to the decision point is 100% of that scheduled will not guarantee safety in a continued take-off at the maximum permitted weight either with all engines operating or with one engine inoperative. What improvement in safety, then, will the monitors provide?

They will show up all of those deficiences of performance due to variations which occur before the decision point. They will thus, within their degree of accuracy, remove all risks arising from less than 100% performance at the decision point. This is the monitor's major contribution to safety. Pilots complain that their experience shows that the decision speed is rarely being attained within the scheduled distance. Airworthiness authorities refute these pilot complaints. Statements are made by Certificating Authorities that specific evidence shows that pilot impressions are wrong. Monitors will provide factual information for every take-off, ensuring safe resolution of this controversy on each take-off.

4. TAKE-OFF MONITORING WHERE EXCESS LENGTH IS AVAILABLE

At this point it must be made clear that aeroplane take-offs fall into two different categories:

1. Where the weight is the maximum permitted by the runway conditions prevailing;
2. Where the weight is less than this.

Although it is foreseen that a higher proportion of flights will be at the maximum permitted weight, not all flights will be. In some cases the take-off weight will be restricted by the obstacle clearance, en route or landing requirements. And sometimes economic factors will not require the maximum permitted.

The first question to be resolved is: Can excess lengths be utilised to permit continued take-off with less than 100% of scheduled performance? It might be argued that performance does not relate solely to the take-off lengths. Obstacle clearance, en route and landing requirements also demand sufficient performance. On the other hand it must be remembered that what is being measured is not pure aeroplane performance but aeroplane performance in particular circumstances. The performance measured is being affected by external conditions such as runway surfaces and slopes, for example.

Thus the first question to be resolved is: Assuming the take-off performance to be dominant over the en route performance (as is usually the case), can excess runway length be utilised to permit continued take-off with less than 100% of scheduledperformance? If so, how can we translate the additional lengths available into a measurement of degree of performance loss acceptable?

It has been stated earlier that there is no reason to suppose that variations of performance do not occur after the decision point as well as before it. Therefore, we must make an allowance for further deterioration after the decision point, even with all engines operating. We must also make an allowance for complete failure of one engine at the decision point. Thus, if we are to permit excess runway lengths to compensate for deficient performance what we must guarantee is that -

i) with the speed already achieved in the distance gone;

ii) with the present acceleration;

iii) with a further deterioration at the decision point equivalent to the longer of:
   a) the all engines operating factor*, and
   b) complete failure of the critical engine

the aeroplane can continue to take-off safely - i.e. will satisfy the performance regulations.

There would appear to be no insuperable difficulty in designing a monitor to provide this information and it is possible that economic considerations might well justify this course. However, even without such a refinement, the provision of a monitor during take-off from runways of excess length means that the pilot has the benefit of monitoring related to that length of runway on which the actual aeroplane weight would be the maximum permitted and is thus that much better off in assessing whether a continued take-off (or an abort) is justified in the face of the reduced performance indicated (but not, in this case, quantitatively measured) by the monitor.

5. WHERE DOES THE PILOT MAKE HIS DECISION?

Until the aeroplane has reached the last point of its take-off run from which it can safely stop, the take-off is to be aborted in the event of engine failure or other emergency. This is the present concept of the V_1 speed. Deficient performance, as indicated by a take-off monitor, will in future be included in the category of engine failure or other emergency.

V_1, or the decision speed, was assumed to be reached in a scheduled distance. From this speed at the scheduled distance, sufficient distance was scheduled available for a safe stop. However, if the aeroplane is down on performance, the speed will be reached in a greater than scheduled distance, and thus insufficient distance

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* Strictly speaking the margins in this case should not be the same in distance as the margins applied in the case of a normal take-off from a critical runway. They should, however, be the same in proportion (i.e. .15 or .18), the amount being related to the increased take-off lengths as determined by the monitor during the take-off run.

will remain for a safe stop. How, if speed is an unreliable criterion, is the monitor to provide the information that the last safe stopping point has been reached?

In providing knowledge of the last point at which it is safe to stop, the device requires to know the calculated stopping distance of the aeroplane. The device cannot calculate this for itself, but is dependent upon information supplied to it.

The assumption on stopping distance made in the present regulations is that the aeroplane may use all reliable means of deceleration and that the stop is made on a dry hard surface. This distance as achieved in the certification test, is not factored* in any way. It is true that the international specifications** state that the requirements must be conservatively applied and that the result of this has been the few aeroplanes fitted with reverse thrust have been credited with its use in measuring the stopping distance. However, the regulations do not state that the distance must be factored by withholding credit for such reverse thrust nor do they provide a factor for aeroplanes without such devices. Airline pilots are of the opinion that the present unfactored stopping distance is dangerous. Thus the information provided by the monitor will also be considered dangerous unless full account is taken of all the factors affecting the aeroplane's ability to stop.

It will be of assistance here if we give an example of one way in which the information may be provided. The example is used merely to facilitate discussion of the problem of the decision point.

What the pilot wants to know is when he is at the last safe stopping point. A simple way of supplying this information is by a counter-type instrument showing the number of feet to go to this last safe stopping point. For example, let us consider a runway of 9000 feet length. The pilot obtains the information that, in the conditions prevailing, the distance he requires to stop the aeroplane is 3000 feet. Accordingly, he sets the monitor at 6000 feet for decision point. During take-off run, the reading will steadily decrease until it shows zero when the last safe stopping point is reached at 6000 ft. from the beginning of the take-off.

We have seen that stopping distance must, in order to be safe, take full account of runway surface, aeroplane weight, pilot's reaction time, runway slope, and all other conditions which may affect the achieved stopping distance in day-to-day operation. One of these conditions is the speed of the aeroplane. Here, then, is a new problem: from what speed should the stopping distance be

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* but see footnote on page 3

** see Report of second meeting of Airworthiness Committee calculated? The simple answer, of course, is the speed which the aeroplane has at the decision point - in our example 6000 ft. down the runway. A computor might be able to provide information based on the speed actually achieved at this point. But in the absence of a computor, what speed should be used?

Let us see first the highest possible value of this speed. It may be assumed that the take-off will not be discontinued after rotation has commenced, so that we can say that the highest speed will be the rotation speed, V_R, applicable to the actual take-off weight. When will the speed from which the stopping distance is calculated be less than this? Only when the last safe stopping point is reached before the rotation speed is reached. That is, when the stopping distance becomes the limiting factor. This is similar to the current situation where the decision speed is reduced below V_R since the aeroplane can only be stopped safely from this lower decision speed.

Now in these cases we have a situation as follows. If the aeroplane has its scheduled performance or worse, the decision to stop can be safely postponed until the last safe stopping point, shown by a distance indication, is reached. However, if the performance up to the decision point is better than scheduled and an emergency arises immediately before that point, as shown by distance indication, is reached, the aeroplane cannot stop safely since it is at a higher speed than that from which the stopping distance has been calculated.

One solution, in the absence of a computor, would appear to be that in such cases the decision must be made at the decision speed or at the decision distance, whichever comes first. With this solution, the concept of a V_1 speed, as well as a decision distance must be retained. If decision speed has been reached before the decision distance, the pilot is committed to continue since he cannot thereafter be guaranteed a safe stop. If decision speed has not been reached by the decision distance, the pilot must then stop since performance is deficient. This method is, however, not precise, since, in the case of the decision speed being met before the decision point, stopping immediately from that speed would leave a margin of original stopping distance approximately equal to the difference between the V_1 point and the predetermined decision point. Presumably, a monitor designed to integrate speed and distance could determine a more precise decision point, taking into account the stopping length required.

In cases where decision speed is not limited by the stopping distance available, the decision speed will be equal to - since it cannot be greater than - V_R, and no problem arises. In such cases the scheduled stopping distance will be based on the V_R speed, and no higher speed on the ground will be attained.

It may be argued that there is a disadvantage in using both the decision speed and the decision distance in one case and only decision distance in another in that pilot procedures will not be sufficiently standardised.

But it this true? We have said that, on reaching V_R speed on any take-off, the pilot will be committed. Therefore he will be using both a speed and a distance criterion on every take-off. In fact, the situation will be similar to that currently used. Sometimes V_1 and V_2 are identical. In future, V_1 and V_2 will sometimes be identical. What is being added is the new distance criterion. A more important objection is that the airspeed indicator may give an unreliable indication of speed at this stage in the flight. It would appear that some other method of providing the speed information may be necessary. However, the concept remains unaltered.

It is now proposed to examine the information provided to the pilot at this point.

6. HOW DO THE MONITORS INDICATE ACHIEVED PERFORMANCE?

This paper will not attempt to discuss the individual monitoring devices described by the manufacturers, but it is necessary to look at the types of presentation in broad terms in order to see how the information presented is to be used by the pilot. We have said that monitors will present indication of the performance actually being achieved, but we have not said just what the indication of achieved performance is.

A "one-off" check sometime during the take-off run provides the simplest form of take-off monitoring. It may be, for example, a check of speed against time or distance. This type of monitor thus provides a measurement of the cumulative effect of performance so far. Provided the regulations on stopping distance are altered, this check can be postponed to the last safe stopping point. Such a check, by showing up deficient performance, would provide a great step onward in safety. But is it suffcient? Let us examine the information which may be provided by a monitor capable of indicating both cumulative and instantaneous performance.

Consider the case where an aeroplane has better than 100% performance up to a short distance before the decision point and then the acceleration falls below that scheduled. According to the instantaneous indication, after the point where the performance changes, the acceleration will be below normal. However, it is quite possible that the decision speed will be achieved in the decision distance and hence a second indication based on this information will contradict that given by the acceleration.

Thus measurement of the performance being achieved instantaneously is not enough. If the pilot is told to abort whenever the indication is of less than 100% performance, unnecessary aborts may occur since the total performance during the run may have been satisfactory. The pilot cannot prepare a mental record of the cumulative effect.

A measurement of the cumulative effect of the performance achieved so far, is also by itself not enough. This is shown by our example in which instantaneous performance falls, after greater than 100% performance early in the run. It is possible that it will be argued that if the cumulative performance up to the decision point is adequate, the inadequate instantaneous performance will be covered by the all engines operating factor and the low probability of one engine failure subsequent to this point. However, this would clearly depend on how much the instantaneous performance was deficient and this will not necessarily be less than the margin. Hence measurement of instantaneous performance is necessary in the case of a critical runway. It is also necessary in the excess take-off length case since, without measurement of instantaneous performance, insufficient information is available as to whether corresponding extra distance to get airborne will be required after the decision point.

Thus, it would appear that the more information given by the monitor the greater the safety and the greater the economic advantage - provided always that the information can be easily assimilated.

7. SHOULD THE ACHIEVED PERFORMANCE MEASURED INCLUDE WIND EFFECTS?

The items which influence an aeroplane's total take-off performance include runway surfaces, slopes, power output, aeroplane drag and the wind. Should the performance measured by the monitor include the effect of wind or exclude its effect?

It must be remembered that civil requirements at present calculate the take-off wind by using 50% of the forecast headwind component and 150% of the forecast tailwind component.

If the monitor compares achieved ground speed with the calculated ground speed, then the monitor is making an assumption that the wind effect is protected by the factorisation of the forecast wind. This calculated ground speed must be calculated using the factorised wind, just as the take-off weight is calculated using the factorised wind. If the effect of wind is excluded from the monitor in this way, the performance of the aeroplane alone may be measured. If the monitor compares achieved airspeed with calculated airspeed, then the wind effect is also being monitored. If the effect of wind is included the overall performance of the aeroplane during the take-off is measured. This would permit a wind effect to mask or compensate deficient aeroplane performance. This disadvantage - if it is a disadvantage - could be removed by calculating the take-off weight and airspeed on the full forecast component unfactorised.

However, in the case of wind, as in the case of take-off margins, it must be remembered that the take-off is not complete when the aeroplane has reached the decision point. Adequate margins must be provided for variations in wind effects after the aeroplane has passed the decision point on a continued take-off. Also, if the wind were not factorised for the calculation of weight and speed, then the take-off would have to be aborted whenever the wind fell below 100% of that forecast. This would probably lead to an economically unacceptable number of aborted take-offs.
