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AVIATION SAFETY DIGEST

No 1

Including Summary of Accident and Incident Reports

JULY, 1953

Prepared by The Accident Investigation and Analysis Branch

Published by Authority The Director-General

Foreword

For some time, we have been of the opinion that the wide interest displayed in the "Accident and Incident Summary" merited better presentation of this material. Our efforts have resulted in the "Air Safety Digest," the first edition of which we now present.

Having achieved an improved form of publication, we do not intend to rest on our laurels. Already we can see avenues for further improvement, and one section that will be given more attention in future is that dealing with Incident Reports.

The main reason for wishing to bring that section into greater prominence is that the Incident Report is probably the best means available to persons interested in improving the safety of air operations.

Unfortunately, the Incident Reporting system seems to be viewed with distrust by certain sections of the pilot community. By devoting more attention to illustrating the potential benefits of the system in future editions of the Digest, it is hoped to take a positive step in establishing greater faith in the system.

We realize that there are other reasons for the apparent lack of confidence, the main one of which is probably the apparently long delay in completing investigation of many incidents. Work is proceeding on this problem, and an improvement in this regard should be made in the very near future. Of course, in cases where the incident is one of a pattern requiring an overall study, a speedy investigation is not always possible. In such cases it is intended to acquaint pilots of the reasons for the delay and of the progress of the investigation.

Besides speeding up investigations, the system must also produce results if it is to be worthwhile. At times, the results may not be evident to those directly responsible for the operation and control of aircraft, as instanced in the article dealing with DC-4 Auto Pilots in the incident section of this edition. However, by correspondence and by enlarging the incident section of this publication, we hope to convince all concerned that valuable results are being obtained.

AVIATION SAFETY DIGEST

No. 1—JULY, 1953

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PART I

AVIATION NEWS AND VIEWS

Cockpit Design and Safety

Adapted from a paper presented by W. I. Stieglitz to I.A.S. Meeting, Los Angeles, July, 1952

TWO Overseas Accident Reports included in this Digest indicate that the cause could have been connected with the design and placement of certain controls and switches in the aircraft concerned.

The question of cockpit design in relation to safety of operations has been given a good deal of consideration in the aviation industry following a careful analysis of many accidents which, although assessed as due to "pilot error," indicated that earlier design error made the pilot's error more probable under the particular set of conditions.

Modern Developments

The development of the modern aeroplane has resulted in a continually increasing complexity of instrumentation and controls. However, one element of the cockpit has remained unchanged, namely, the pilot. The man who is flying aeroplanes today is basically the same man who was flying aeroplanes thirty years ago. Although his attitude may have changed, and he is probably more willing to face complex situations, he has the same basic limitations—his mental and physical reactions are fundamentally the same, and his reaction time is unchanged.

The combination of unchanging man and increasing complexity of the machine has at times placed demands on the pilot which have exceeded his basic human limitations, resulting in many accidents which could have been prevented.

The solution of the problem requires an examination of the ways in which the increasing complexity of the machine has affected the unchanged operator. The problem can be considered under three main headings.

First, the modern aeroplane has greater speed, with the result that a pilot has less time to make decisions, while at the same time he must be more accurate because of the decreased margin of error.

Second, the improved performance and more complex functional systems have resulted in a greatly increased amount of instrumentation. Thus the pilot is being provided with more information, all of which must be recognized, analyzed and correlated.

Third, the number of controls in the cockpit has increased correspondingly, while frequently a more complex system of control manipulation is necessary. Both the increased amount of instrumentation and the greater number of controls tend to increase the time required for the pilot to assess the situation and to act accordingly. The combined result is that greater precision is demanded of the pilot, less time is available for him to act, and yet he really requires more time than previously.

The ultimate in overcoming these difficulties would appear to be the development of the pilot, by proper training, to the extent that the instruments become part of a new sensory external nervous system and the controls become merely an extension of his motor system.

Instrument Display

With regard to the problem of instrument displays, it is necessary for the information to be presented to the pilot in a readily understandable form which does not require conscious interpretation. The solution would appear to come not only from the design and improvement of individual instruments, but from the development of an integrated instrument system. This is a problem for the combined efforts of psychologists, engineers, pilots and flight surgeons, and cannot be left solely to instrument specialists.

Instrument Arrangement

Another aspect is instrument arrangement. Steps have been taken by the aviation industry to develop a standard grouping of basic flight instruments, and many airline operators have developed their own standard arrangements. However, few, if any, of these arrangements are the same. The very fact that so many different arrangements have been used with comparable safety would indicate that so long as a well planned arrangement is used, the exact grouping is of less importance than the existence of a standard arrangement. It is desirable, however, that the arrangement should ensure that the most commonly used instruments are most easily seen, and the most frequent eye movements are as short as possible.

The other major phase of the cockpit design problem concerns controls. If the controls are to be merely an extension of the pilot's motor system, it is necessary for the control motion to be completely natural for the pilot, so that his only decision need be what effect he wishes to produce, without the need for conscious determination of which control to move, where it is, and in what direction to move it. Selection of the proper control is a matter for pilot training; control location, identification and direction of motion are a matter of design.

Preventing Control Confusion

There are possibly two effective and practical means of preventing control confusion: one is to provide shape coding of critical knobs to permit contact discrimination, and the other is standardization of the location of the controls. By the latter is not meant rigid dimensional discrimination, but rather that a given control always be in the same area, and that the controls be in the same position relative to each other.

One other factor to be considered in control location is related to the pilot's physiological rather than his psychological characteristics. On the basis of reach, the maximum distances at which a large majority of pilots would be able to reach and operate manual controls would become a primary design consideration.

Control Motion

Control motion is just as important as control location and identification in eliminating pilot difficulties. Here the requirement is that control motion be natural and conform with basic habit patterns. The first rule of naturalness of control motion is that the control move in the same direction and sense as the unit being actuated. In the case of controls for which there is no such direct association, psychological data affords a sound basis for determining what is natural. In designing such controls, the habit patterns of everyday life must be considered and utilized.

Pilot Capacity

The foregoing problems of instrumentation and control cover only one part of the problem. Most important is the overall design approach of considering the pilot and his capacities. Even if all the measures discussed here were fully utilized, the demands placed upon the pilot could exceed human limitations, particularly with regard to the number of duties involved and the speed with which they must be performed.

The basic goal is a man-machine combination that can operate with maximum overall efficiency. While design simplification is highly desirable, it cannot be achieved at the expense of overloading the human element.

In this regard, the use of time-motion studies is of value and some work has already been done in this direction. In one study made on a multi-engine aircraft from

the time of entry to the traffic pattern until touchdown, the co-pilot was required to make 116 distinct motions in 305 seconds, an average of one every 2.6 seconds. Under normal conditions, this routine can be carried out with comparative ease, but under the stress of emergency, or when suffering from fatigue, an error becomes highly probable.

In evaluating crew ability to carry work loads, full consideration must be given to day-by-day variability in performance and to the added effect of fatigue in producing deterioration in these levels.

Emergency Controls

In no phase of cockpit design is full consideration so important as in the design of emergency controls, for in an emergency the time available to take the necessary action is extremely short. Emergency procedures, therefore, must not be complex—controls must be easily identifiable and readily accessible, and control motion and sequence operation should be as simple as possible. It is imperative that all control motions be completely consistent with normal habit patterns, since a person tends to revert to old habits under conditions of stress.

Too frequently there is an attitude that it doesn't matter if emergency controls are complicated or difficult to reach, since they may never be used. This philosophy can cause accidents.

Many so-called pilot errors have resulted from design that failed to consider basic human limitations. In order to eliminate such accident potential, a new design outlook is needed. To maintain a sound man-machine relationship, it is necessary to analyze the qualities of the man. Human engineering has provided the basis for implementing this approach—it remains for the designer to make full use of the available data.

Refuelling Dangers

An aircraft had been fuelled from drum stocks using a portable semi-rotary pump, funnel, and chamois leather filter. On completion of the operation the chamois leather was being squeezed out preparatory to replacing it in the glass chamois container when it suddenly burst into flames, burning the chamois, the aviation gasoline remaining in the funnel and several rags that were lying around. Prompt action in removing two drums of aviation gasoline and the aircraft from the scene of the fire prevented what could have been a serious incident. In extinguishing the fire one person had his hands slightly burnt.

Cause Of The Fire

On the evidence available it appears that the action of squeezing the chamois caused a static charge to be built up which, when it discharged, caused a spark of sufficient intensity to ignite the highly inflammable gas surrounding the chamois. With a partially dry chamois there is a remote possibility that the air trapped in the folds, on being forced through the pores of the chamois, would cause enough friction to generate a static charge. The phenomenon of static charges building up on various bodies depends on so many factors such as atmospheric conditions, handling of materials and nature of equipment used, that there is no infallible method of preventing a charge being generated.

Prevention

Although it is acknowledged that fires have occurred without the source of ignition being definitely established, much can be done to prevent the possibility of a fire starting, and certainly to confine any outbreak.

Take for instance the case already mentioned. It may not have been possible to prevent the chamois catching fire but it could have been confined to this item had the following precautions been observed.

Removal of the chamois away from the aircraft and drum stocks to a place where a fire would not have presented a hazard.

Emptying of the fuel in the water-trap funnel into a container immediately after use.

Not allowing rags or similar combustible material to be left lying about where the aircraft is fuelled.

A potential source of danger which applies more particularly in country airfields where spectator or passenger supervision is difficult to control, is the habit of people smoking in the immediate vicinity of an aircraft that is being fuelled. Under particular weather conditions gasoline fumes may travel some distance and be ignited by a match, lighter or person smoking. As it is not always easy to detect offending persons, those people not actually concerned in the fuelling of an aircraft should be kept at least 50 feet away until the servicing has been completed and the aviation gasoline, whether it be in drums, tins, or other containers, and the equipment, has been removed. A check before fuelling commences to see that no smoking is being indulged in by anyone near the aircraft may save a lot of trouble later on.

A few simple DO'S AND DON'TS worth remembering are:—

DO follow the procedure laid down in Fuelling Instructions.

DO take any other precautions that make for added safety.

DO ask for a direction if in doubt.

DO remember to make the earthing connections which, in the case of fuelling from drums, is—

(1) earthing cable from drum to aircraft,

(2) earthing cable from nozzle control valve to aircraft,

(3) earthing cable from nozzle control valve to funnel,

(4) earthing cable from nozzle control valve to chamois filter.

(All before removing the tank filler cap on the aircraft).

DO remember to replace the tank filler cap and then take off the earthing connections in the reverse order.

DON'T take chances.

DON'T attempt to fuel an aircraft if you see anybody smoking or using matches or a lighter within 50 feet.

DON'T leave drums—full or empty—around without the bungs screwed in.

DON'T clean chamois filters, funnels, measures, etc., near an aircraft.

DON'T leave aviation gasoline in open containers. This applies particularly to watertrap funnels, sample jars and chamois containers. (The latter two containers should have lids on them and the funnels drained immediately after use).

DON'T leave rags lying around on equipment.

The precautions to be observed during aircraft refuelling operations have been clearly set out by the Department in A.N.O. Part 20 Section 20.9.2.

How Long Does it Take to Feather Manually?

(By courtesy of Flight Safety Bulletin 52.12.)

WHILE obtaining data for a comparison of take-off and climb performance in actual operating conditions for Douglas C54A aircraft, a frequency plot was made of the pilot time required to recognize an engine failure and to complete corrective action on the primary controls following engine failure at V_1 speed during the take-off run.

The resultant curve showed that plots occurred most frequently between 1.75 and 2.5 seconds while the arithmetic mean time was 2.6 seconds. However, the time to recognize an engine failure and complete corrective action in this curve was not considered to be indicative of the actual case, since in all take-offs, the pilot was expecting an engine to be cut at V_1 speed. The data recorded, however, indicates that a minimum of 2.6 seconds of the pilot's time will be required in coping with an engine failure.

The elapsed time from the instant after the aeroplane was brought under control following an engine failure at V_1 speed until the pilot called for the retraction of the landing gear varied with the technique used during take-off. If the nose gear was held on the runway until V_2 speed, the gear obviously cannot be retracted until after V_2 speed has been obtained, and a safe altitude for retraction reached.

It was of interest to note that in one or two instances the pilot forgot about retracting the gear until the co-pilot placed his hand on the retraction lever.

Starting Accidents

ALTHOUGH the frequency of starting accidents with DH.82's does not justify any specific "bone-pointing", an analysis over recent months has highlighted the increase in this type of accident, as compared with the relatively small number of similar accidents during the previous twelve months.

As student pilots were mainly involved in the accidents and as carelessness on their part was the main cause of the accidents, C.F.I.'s and instructors are urged to re-emphasize the care which is necessary during engine starting and to insist on the adherence to approved engine starting procedures.

Finally, it is sufficient to add that starting accidents are not all confined to flying training.

How Good Can You Get?

THE following report of a wheels-up landing made by a cool-headed American pilot is reproduced by courtesy of the United States Chiefs of Naval Operations and Bureau of Aeronautics, in whose magazine Naval Aviation News it first appeared.

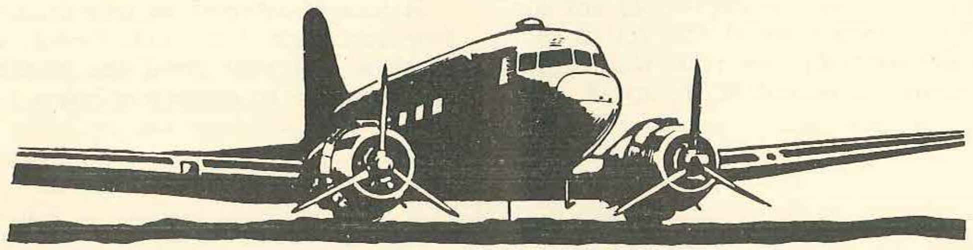
During a test flight of a C-47, an Air Force pilot with 6,600 flight hours discovered that he was only able to lower one undercarriage leg. The tower was informed of the trouble and hurried consultations were made with maintenance and operations staff. The pilot was advised to fly locally until he had burned up most of his fuel and then to come in with both wheels up and to cut all switches before landing.

The pilot knew a lot about the particular plane that he was flying and realized that when the C-47 landing gear was fully retracted, the tyres extended about six inches below the wheel wells and that the wheels would turn and that full braking action was available even with the wheels retracted.

He decided that there was a good possibility that the plane could be landed wheels-up without any damage.

The one thing which caused him concern was to prevent the propeller blade tips from striking the ground.

He planned his final approach with altitude to spare. As he came "down the groove" and saw that he was going to make the field, he feathered both propellers . . . then used the electric starter to position them so that they would not touch the runway. He cut all switches, held off, and made a nice three-point landing. The C-47 rolled down the runway on the retracted gear.



When the crash crews pulled alongside the plane, they found that there had really been no crash at all—just a dead stick, wheels-up landing with not a scratch on the aircraft. The plane was lifted with jacks, the pins were put in the landing gear and it was taxied to the hangar.

PART II

OVERSEAS ACCIDENTS

Landing Accident - C46 - Grand Island, Nebraska
(Accident No 273)

SHORTLY after take-off, a C46 freighter made an emergency landing with the landing gear retracted in a field about three-quarters of a mile southwest of Grand Island Airport, Nebraska. Both pilots were uninjured. The aircraft was substantially damaged.

History Of The Flight

After the cockpit check list and normal engine run up were completed, the aircraft, loaded to 911 pounds less than the maximum allowable gross weight of 48,000 pounds, took off from Runway 3 at Grand Island, the altitude of which is 1846 feet about M.S.L.

At an indicated altitude of 2900 feet, a left climbing turn was made. At the completion of this turn, and in the vicinity of the Radio Range Station, located 1 7/10 miles, 345°M from the airport, the throttle and propeller controls of the right engine were retarded and the captain called for the single-engine check list.

The co-pilot was instructed not to shut the fuel off and not to operate the firewall shut-off valve. Grand Island Communications was then advised that the aircraft intended to return and make a single-engine landing on Runway 3. The captain later testified that he only intended to make an approach.

After reading the single-engine check list and trimming the aircraft for single-engine flight, the right propeller was feathered. The indicated airspeed at this time was approximately 140 m.p.h. with the left engine operating at 42″ and 2400 r.p.m.

During the turn towards the airport, the airspeed decreased to 120 m.p.h. and the altitude to about 600 feet above the ground. Power on the left engine was then increased to 44″ and 2550 r.p.m. (maximum continuous), but the aircraft still lost altitude at about 200 feet per minute and the airspeed remained at 120 m.p.h. The left engine was then advanced to 47″ and 2750 r.p.m.

By this time, the airspeed was down to approximately 105 m.p.h. and the aircraft was about 300 feet above the terrain. From the time of feathering, the aircraft lost altitude at a rate varying from 200 feet to 500 feet per minute.

The co-pilot was then ordered to unfeather the right engine, but his efforts proved unsuccessful. About half a mile west of the airport and about 200 feet above the ground with the gear and flaps up, a left turn was made towards the runway. At an airspeed of 80-85 m.p.h., the aircraft was felt to "buffet," and as the left turn could not be completed, the aircraft was landed straight ahead in a field approximately 4620 feet south-west of the airport. The aircraft skidded about 850 feet before coming to rest.

The local weather at the time of the accident was:—

Scattered cloud 20,000 feet, visibility 15 miles, temperature 78°F, dewpoint 48° Wind ENE 16, barometer pressure 30.08 ins.

Investigation

An examination of the aircraft revealed that there was no evidence of any structural failure prior to impact, while there appeared to be no reason why the engines should not function normally. An examination of the right propeller dome indicated that the propeller was feathered and that the unfeathering action had not started. No explanation could be found for the failure of the propeller to unfeather, as the feathering mechanism was bench-checked and found to be completely serviceable.

During the investigation, the pilot stated that he had decided prior to departure to practice a simulated single-engine approach after take-off. However, he did not advise the co-pilot of his intention, nor did he determine the density altitude, which at that time was about 4000 feet. Referring to his inability to unfeather the right propeller, the co-pilot stated that he did not have time to go right through the unfeathering check list as the aircraft was losing altitude fairly rapidly and he was repeatedly trying to unfeather the propeller.

The majority of pilot training in the company operating the aircraft involved in this accident is "enroute" training, and in this regard, the flight manual states that one hour of actual or simulated instrument practice must be done during each scheduled flight. It is also customary for pilots to maintain proficiency by practising, for approximately 15 minutes on each flight, any flight manoeuvres considered necessary. Because of an impending six month check, the captain of the aircraft was practising single-engine approaches when the accident occurred.

Subsequent to this accident, the operating company prohibited the feathering of a propeller during simulated single-engine practice unless a check pilot was on board, and then only after a minimum altitude of 4000 feet above the ground had been reached.

The operating company claims that a C46 in the climb configuration using METO power and loaded to 48,000 pounds would climb at a low rate on one engine at a density altitude of 7600 feet. At a density altitude of 4000 feet, which was the condition at the time of the accident, with one engine feathered and the other operating at METO power, and with the gear and flap up, cowl flap 20° open, weight 47,089 pounds, and IAS 130 m.p.h., the aircraft should climb at about 175 feet per minute. In the same configuration, the aircraft should climb at about 110 feet per minute at the existing temperature of 78°F.

However, several C46 pilots testified that a C46 loaded to 48,000 pounds had marginal single-engine performance, and even when flying at a density altitude below 7600 feet, would not always maintain altitude. These witnesses considered that when the aircraft was loaded to 48,000 pounds, a high degree of pilot proficiency was necessary to maintain altitude due to the marginal single-engine performance and the lack of an allowable margin for pilot error.

Analysis

The investigation of this accident indicates that the failure of the captain to check the density altitude prior to take-off can be questioned, since this omission prevented him from knowing what single-engine performance could be expected. In addition, he displayed poor judgment in actually feathering the propeller at such a low altitude and with the aircraft loaded close to its allowable gross weight. The safer, and accepted, procedure would have been to reduce power to near zero thrust. Then, in the event of an emergency, power would have been readily available.

The captain was also aware that with a C46 loaded to 47,089 pounds flying on one engine with the gear and flaps up it is difficult to maintain level flight at an airspeed appreciably below 130 m.p.h. when less than METO power is being developed by the working engine. In this case, the initial speed was 140 m.p.h., and when METO power was not applied, crucial airspeed and altitude were lost. With the airspeed nearing 120 m.p.h., and the aircraft rapidly losing height, it is doubtful if even the immediate application of take-off power would have prevented a continuing loss of altitude.

No effort was made to make maximum power available by unfeathering the right propeller until the aircraft had descended to about 300 feet above the ground. At this low altitude, and with the aircraft descending rapidly, it is doubtful if there was sufficient time to completely unfeather before contacting the ground.

Probable Cause

The probable cause of the accident was the captain's action, under the existing conditions, in voluntarily committing the flight to single-engine operation, and his subsequent poor judgment and technique while attempting to effect recovery.

Take-Off Accident - DH Comet at Rome on 26th October, 1952

(Accident No 7009)

WHILE taking off from Ciampino Airport, Rome, the speed of a Comet failed to build up and after becoming airborne for a few seconds, the captain, acting under the impression that there was a lack of engine thrust, decided to abandon the take-off and throttled back the engines. At the same time, the aircraft hit an obstruction a short distance beyond the end of the runway and finally came to rest near the airport boundary.

The aircraft sustained considerable damage and two passengers were slightly injured.

The Flight

The Comet scheduled passenger service to Johannesburg is made via Rome and Cairo. Flight No. 115/030 departed from London Airport on 26th October, 1952, at 1358 hours and arrived at Ciampino Airport at 1637 hours. The total traffic load was 4463 kgs. The flight was made without incident and an entry in the technical log of "No Defects" was made by the captain. At Rome, four passengers disembarked and five joined the flight and the total traffic load for the stage to Cairo was 4703 kgs. The aircraft was refuelled to a capacity of 17578 kgs. and a departure check made; there were no defects. On completion of the traffic and control procedures the engines were started and a taxi clearance, together with an amended wind speed and direction, were given by Flying Control. The aircraft was taxied to Runway 16 and lined up on the centre line; all pre-take-off checks were made and the elevator, aileron and rudder trims were set at the neutral position. The captain's estimation of runway visibility was five miles but with no horizon. The flaps were lowered to 15° and the windscreen wipers were both operating. The engines were opened up to full power and the isolation switches were set to "Isolate." The r.p.m. were checked at 10,250 on all engines; fuel flows, engine temperatures and pressures were reported to be correct. The brakes were released and the aircraft made a normal acceleration. At an I.A.S. of 75-80 kts. the nose wheel was lifted from the runway and a slight tendency to swing to starboard was corrected. At an I.A.S. of 112 kts. the captain lifted the aircraft from the ground by a positive backward movement of the control column and when he considered that the aircraft had reached a safe height he called for "undercarriage up". At about the same instant the port wing dropped rather violently and the aircraft swung to port; the controls gave normal response and lateral level was regained. At this point the captain felt that the aircraft's speed was not building up, although he made no reference to the A.S.I. A pronounced judder was felt which he associated with the onset of a stall and in spite of two corrective movements of the control column the judder continued. Before the first officer had time to select undercarriage up, the aircraft came down on its main landing wheels and bounced. It was now plainly evident to the captain that the aircraft's speed was not increasing and he was convinced that there was a considerable loss of engine thrust. He was also aware that the aircraft was rapidly approaching the end of the runway and a decision to abandon the take-off was made. The undercarriage struck a mound of earth as he was closing the throttles and the aircraft slid for some 270 yards over rough ground and came to rest within 10 yards of the boundary fence. The main undercarriages were wrenched off and considerable damage resulted; a large spillage of fuel occurred but fire did not break out. One passenger suffered slight shock and another sustained a cut finger.

Subsequent interrogation of the crew confirmed that all engines had given their maximum power and that fuel flows, temperatures and pressures had all been normal during the take-off. It was the belief of the first officer that the nose wheel was lifted from the ground in the usual manner although the control column appeared to be "a fair way back." He also thought that the "unstick" was made by moving the control half way back from the neutral position and that it was held there until the port wing dropped. He also stated that he was unable to determine the attitude of the aircraft after the bounce as no runway lights were visible to him.

Due to darkness and due also to the rain no ground witness had a clear view of the take-off. One, however, who observed it from a point opposite the half way position of the runway, considered that the aircraft's attitude was "critical" as it passed him. He continued to observe it as the nose was exceptionally high and he was not aware that the aircraft became airborne.

Inspection Of Wreckage

An inspection carried out at the scene of the accident showed that large spillage of fuel from the port wing integral tanks had occurred but fire did not not break out. Both inertia switches had tripped. The two crash switch operating levers functioned correctly and the methyl bromide fire extinguisher bottles had discharged. The seats and their attachments in the crew and passenger compartments were undamaged. The crew's forward entrance door and the passengers' entrance door functioned normally, as did also the emergency hatches. The flaps were in the lowered position of about 15° and this corresponded to that indicated in the cockpit. The elevator, aileron and rudder trim indicators were in the neutral position. Wheel marks on the runway showed that the main landing wheels had been in contact with the runway over the last 30 feet of its length. The next contact was made on two mounds of earth; when this occurred the undercarriages were wrenched off and parts of these units damaged the tailplane; part of the brake hose was lodged in the tailplane. The port front main wheels ran forward and struck the ILS van with force. The port main plane hit the runway direction indicator which is mounted on concrete blocks and the wing tip and pitot head were torn off. The starboard inner engine steady strut had become detached at its forward end when the attachment bracket rivets had sheared due to impact forces. This detachment allowed the engine to rotate on its mounting trunnions through the mainplane skin and in a nose down direction. The nose wheel was forced upwards into its housing and the tail bumper unit was torn from the rear portion of the fuselage. The bumper attachment showed that the shoe was missing and that the bracket was deeply scarred. A search made along the runway revealed evidence of tail bumper marks which varied in length from 3 feet to 40 feet. These marks extended along the last 650 yards of the runway and showed that the aircraft's track was inclined a few degrees to starboard of the runway centre line.

Take Off Techniques

The B.O.A.C. Training Manual recommends the following take-off technique:—

"At 80 kts. the nose should be lifted until the rumble of the nose wheel ceases. Care should be taken not to overdo this and adopt an exaggerated tail-down attitude with a consequent poor acceleration."

The normal fuselage incidence during the take-off ground run is about 2°-3° after the nose-wheel has been raised just clear of the runway. To achieve this a backward stick movement of about 4 inches is required which is then reduced to 1½ inches. The attitude at "unstick" is approximately 6°-6½° and to attain this the required stick movement at the time of leaving the ground is of the order of 6 inches back from the neutral position after which the stick must be returned towards the pre-take-off position.

Take-off tests by the manufacturers have shown that a constant 6° incidence of fuselage during the ground run gives good results for distance run and for climb-away behaviour. They have also shown that an increase of incidence to 9° results in a partially stalled wing inducing high drag which appreciably affects the aircraft's acceleration, and that the symptoms are noticeable to the pilot as a low frequency buffet. The aircraft recovers from its semi-stalled position if the nose is pushed well down.

Conclusions

1. There was no failure or malfunctioning of the airframe or of its engines.

2. The aircrafts' normal acceleration did not build up due to the progressive nose-up attitude of the aircraft which was permitted to develop and which resulted in high drag and semi-stalled condition.

Probable Cause

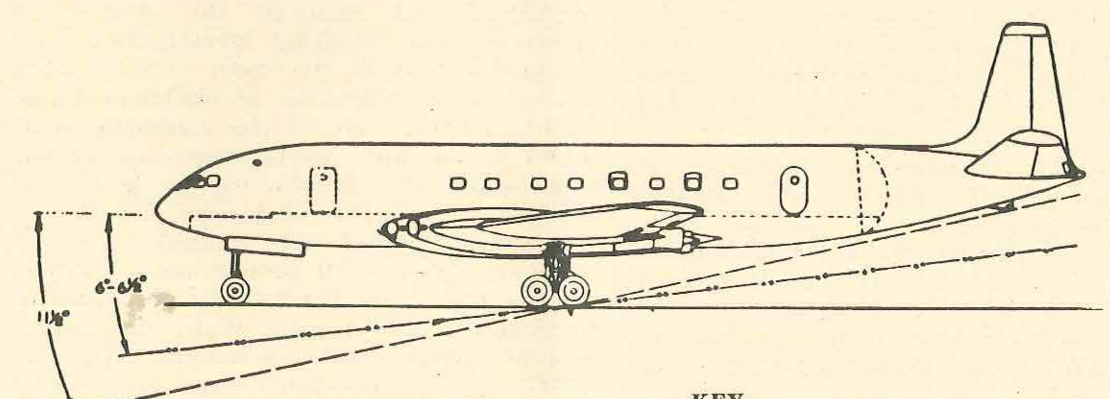
It was the opinion of the investigators that the accident was due to an error of judgment by the captain in not appreciating the excessive nose-up attitude of the aircraft during the take-off.

Comment

On 3rd March, 1953, while on a ferry flight to Australia a D.H. Comet crashed on take-off from Karachi, Pakistan.

Initial reports indicate that the circumstances of this accident are similar in many respects to the Comet accident at Rome referred to above.

Details of the Karachi accident will be published when they become available.



KEY

Represents Ground Line with Nose Wheel on Ground ————————
Represents Ground Line with Aircraft correct "Unstick" Attitude 6°-6½° Nose-up — . . — . . — . .
Represents Ground Line with Tail Bumper touching ground 11½° Nose-up — — — — —

In the above sketch, recommended fuselage incidence at "unstick" (6°-6½°) is compared with the angle of incidence required (at least 11½°) for the tail bumper to touch the ground. The normal fuselage—incidence during the take-off run (between "nose up" and "unstick") is about 2°-3°.

DC-6 Struck Mountain - Fort Collins, Colorado

(Accident No 278)

A DC-6 crashed 18 miles WSW of Fort Collins, Colorado, while enroute from Salt Lake City to Fort Collins. All the occupants were killed and the aircraft was completely demolished.

The Circumstances

The aircraft was en-route from Salt Lake City to Fort Collins, Colorado, carrying 45 passengers (including one infant) and a crew of five. The approved flight clearance indicated an I.F.R. flight to Denver at 15,000 feet. The flight proceeded in a routine manner and at 0104 reported over Rock Springs, Wyoming, at 15,000 feet, with E.T.A. Cheyenne, Wyoming, 0147 and Denver 0207. At 0144 the flight reported having passed the Silver Crown fan marker (located 12 miles west of Cheyenne) and requested a lower altitude. A new clearance was immediately issued—"ARTC clears United . . . to Du Pont intersection, descend to 8,500 feet immediately after passing Cheyenne, maintain 8,500 feet, no delay expected, contact approach control over Dacono" (fan marker located 15 miles N of the Du Pont intersection). This clearance was acknowledged and the flight reported that it was over Cheyenne at 0147, at 15,000 feet and was starting to descend. The Denver altimeter setting was then given the flight as being 30.19 inches. Nine minutes later, at 0156 the flight reported reaching its assigned altitude of 8,500 feet.

No further communication was received from the aircraft. At 0200, the Denver Control Tower requested the company radio operator to advise the flight to call approach control. Repeated calls were made without response. It was later determined that the aircraft had crashed on a mountain 18 miles WSW of Fort Collins, Colorado.

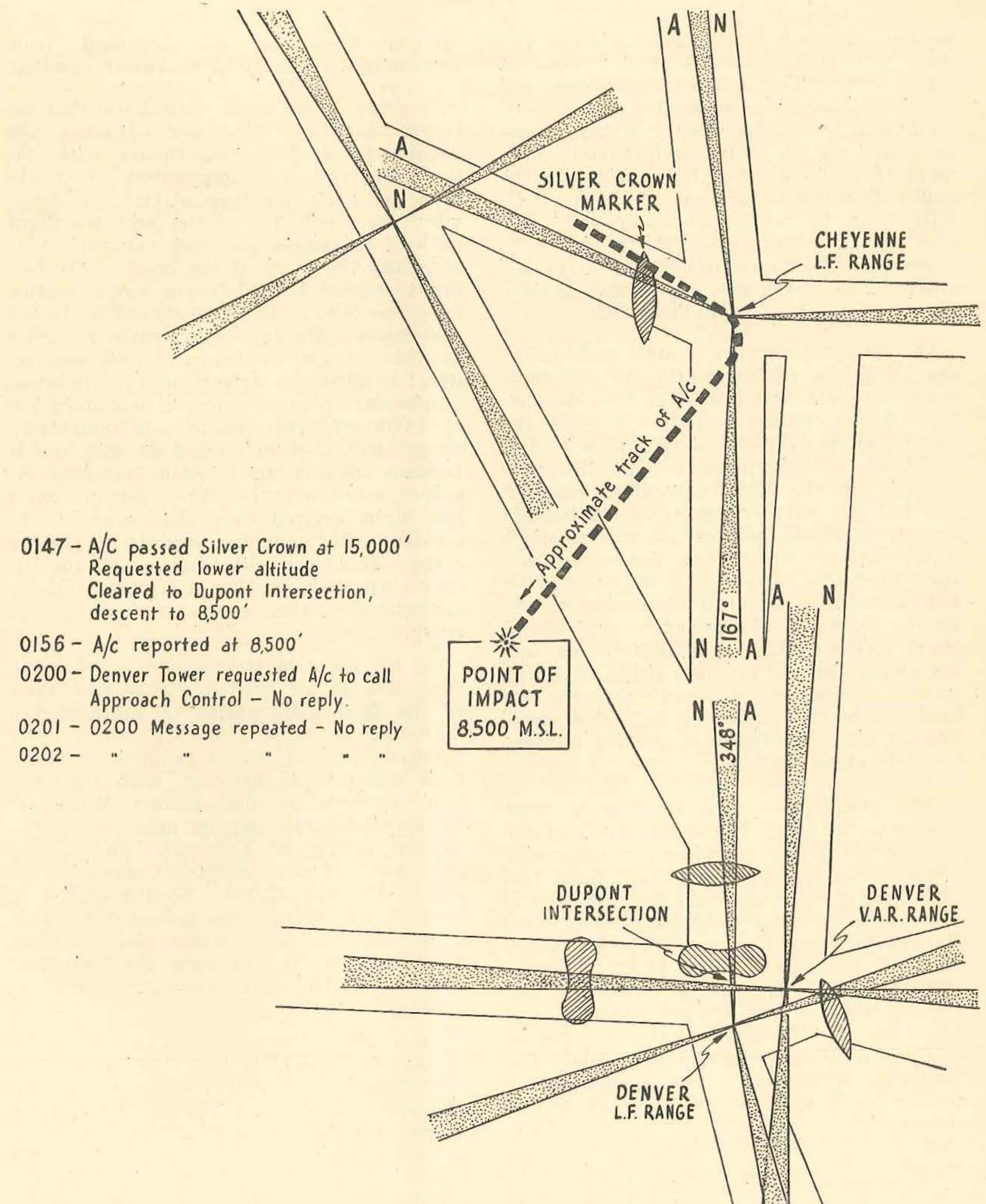
Investigation And Evidence

Investigation disclosed, from the direction of the swath cut through the trees, that the aircraft struck the side of Crystal Mountain while flying left wing low on an approximate magnetic heading of 210°. The altitude at the point of impact was 8,500 feet MSL. After initial contact with the trees the aircraft continued to travel approximately 60 feet, at which point it struck the ground. From there it travelled in a straight line 225 feet, bounced and came to rest 465 feet further on. The aircraft parts assemblies were strewn over a 1,400 foot area. Localized fires occurred after impact.

An examination of the wreckage revealed that at the time of impact the landing gear and flaps were retracted. Nothing was found to indicate any structural failure of the aircraft or its components prior to impact. The damaged engines and propellers were examined and these indicated that all four engines were developing considerable power when the impact occurred. All engine instruments were so severely damaged that their readings were of no value. A study of the aircraft's maintenance records indicated that the aircraft was airworthy at the commencement of flight. It was also established that the gross weight of the aircraft was within approved limits, and the load was properly distributed with respect to the centre of gravity.

Much of the radio navigational equipment and some of the flight instruments were recovered and removed for study and analysis. The resulting investigation indicated that prior to the crash no fire existed in any of the electronic or electrical equipment and that all of the aircraft's communications and navigational equipment was apparently functioning in a normal manner. Conditions of propagation during the times involved were conducive to good radio reception. All ground radio stations in the area were functioning normally, as evidenced by subsequent flight checks and a study of each station's records. The aircraft was heading 210° magnetic, plus or minus a few degrees, at the time of impact.

This last fact was further substantiated by the condition of the directional instruments when recovered. In the cockpit were four heading indication instruments. There were two magnetic or master direction indicators operated by a flux gate compass



PROBABLE FLIGHT PATH OF DC-6 PRIOR TO IMPACT system, one each for the pilot and co-pilot; these were both jammed at a reading of about 210°. The magnetic compass and the directional gyro were also found to be reading approximately 210°. Furthermore, as a part of the radio navigational equipment there were two ADF receivers. The dual indicator azimuth scale of the co-pilot's ADF must be rotated manually and when used to determine a bearing it is set to agree with the magnetic heading of the aircraft. This instrument was found jammed at a reading of approximately 202°.

On each side of the control pedestal of the DC-6 are panels containing six audio selector toggle switches. The two switches nearest the captain actuate the voice and range control positions of that pilot's ADF, the two middle switches actuate the same controls on the VHF navigation receiver, and the two furthermost from the captain actuate identical controls on the co-pilot's ADF. These switches are located so that they cannot be easily seen by either pilot and when using them at night without the use of lights it is customary to feel for them. All switches are of uniform size and are equally spaced on the panel. Although cockpit lights and a small flashlight are available to the captain, it is normal practice to use a minimum of cockpit lighting to avoid glare.

The magnetic course to Denver from Cheyenne is 168°. The audio signals of the Denver low frequency range for this course are heard as an "A" on the left side and an "N" on the right side. At Denver there is another range, namely a VAR (Visual Aural Range), the north course of which nearly parallels the north course of the low frequency range. The audio signals of this course when flying towards Denver are heard as an "N" on the left or east side, and as "A" on the right or west side. The similarity of the tone of the signals emitted by these ranges makes it difficult to differentiate between them. The identification signal "DEN" is identical for both stations. The Denver VAR range, commissioned on 1st January, 1946, has operated for five years in close proximity to the low frequency range and, although both ranges have always utilized the same "DEN" identification signal, there have been no known recorded complaints from airmen that difficulty or confusion resulted.

Recorded radio contact disclosed that between Salt Lake City and Cheyenne the flight was flown in accordance with the flight clearance. An exploratory flight was made in a similar type aircraft to determine the credibility of the probable flight path of the subject aircraft between Cheyenne and the scene of the crash. The test flight crossed the Cheyenne range station from the NW at 15,000 feet, and a shallow descending right turn was started toward a heading of 210° magnetic. Two minutes were required to arrive at this heading. Continuing on this heading, a descent of 700 to 1,000 feet per minute was maintained at an indicated air speed of 245 m.p.h. Descent from 15,000 to 8,500 feet MSL required seven minutes. Four minutes later the flight arrived over the scene of the accident after climbing slightly to clear a ridge. This time, added to the time the aircraft reported crossing Cheyenne, closely approximates the assumed time of the crash.

On the night of the accident a weak upslope flow of air existed on the east slope of the Rocky Mountains in south-eastern Wyoming and north-eastern Colorado. This resulted in cloud layers ranging generally from 8,000 to 17,000 feet, with scattered light showers in south-eastern Wyoming. No thunderstorms existed nearer than the eastern border of Colorado. There were solid layers of cloud south of Cheyenne with base 8,000 and 12,000. No turbulence or icing of significance was indicated for that area. For this area winds aloft between 8,000 and 10,000 feet were northerly and under 10 m.p.h. This was substantially as forecast.

Up to and including the ill-fated flight the captain had flown 29 hours as first officer and 61 hours as captain of DC-6 aircraft. The records also indicated that he had made 11 one-way trips in and out of Denver as captain of this type of aircraft. The first officer had accumulated 5,848 flying hours, of which 1,526 were on DC-6 aircraft and 917 on DC-4's. Both pilots were well acquainted with the terrain which lies to the right of the route between Cheyenne and Denver.

Numerous theories were explored in an effort to determine why the pilot, after crossing Cheyenne, possibly assumed a heading of 210° magnetic and then held this heading until the aircraft crashed into the mountain. One plausible theory is that after the aircraft passed over the Cheyenne range station the Denver low frequency range was tuned for aural directional guidance to Denver. At the same time the Denver VAR range was tuned in for the purpose of identifying the Du Pont intersection, the point to which the flight was cleared. This intersection is the point where the west course of the Denver VAR range crosses the north course of the Denver low frequency range. In order to isolate the low frequency range receiver to aid in its aural reception, the captain may have meant to eliminate the aural signals of the VAR range receiver by depressing the toggle switches (voice and range) which are mounted on the audio selector control panel located near the captain's right knee. As previously stated, in a darkened cockpit the lights must be turned up in order to see these switches and read their positions; however, instead of doing this it is often the practice to feel for them.

It is possible, therefore, that the captain may have inadvertently depressed the wrong switches, the second and third switches from the left, thinking he had depressed the third and fourth (or middle two) switches. This would silence the range signals of the captain's low frequency receiver and also silence the voice feature of the VAR receiver, but would permit the VAR range signals to be audible. As previously stated, the identification signals and tonal qualities of both are identical. After passing over the Cheyenne range station, the normal procedure would be the execution of a standard rate right turn to a heading of approximately 210°, which would intercept the north course of the Denver low frequency range. Also, the signal "A" is on the right (west) side of the north course of the Denver VAR range. It can be seen that on approach to Denver from the north, a right turn to attempt to fly the "on course" of the low frequency range while listening to the "A" (right) side of the VAR range would take the aircraft deeper into the "A" quadrant of the VAR range and thus an "on course" signal would never be heard. However, no logical explanation can be found for the length of time the aircraft was held on a heading which the crew should have known would lead to the mountains west of the airway.

Another possible theory was considered which was subsequently established by a flight conducted by the CAA. After passing Cheyenne, the CAA pilot tuned his ADF to the Denver low frequency range and turned that receiver's selector switch to the compass position. In tuning the Denver frequency of 379 kilocycles he purposely detuned the receiver on the high side. This detuning allowed the receiver to be affected by the range signal of Fort Bridger, Wyoming (located approximately 304 miles WNW of Denver), the frequency of which is 382 kilocycles. As a result the ADF compass needle indicated an average bearing of 225° on the azimuth scale but with the needle "hunting" plus and minus 20°. With the ADF switch in the compass position and with fine tuning it was possible to receive a faint "A" signal and a "DEN" identification. However, it should be noted that when the Denver low frequency range was properly tuned the signals were clear and distinct. Therefore if the captain had inadvertently detuned his ADF, as described above, and was following such a heading thinking his needle indicated the direction of the Denver range station he would have been flying towards the mountains.

The aforementioned theories are based on the premise that the pilot tuned to the Denver ranges after passing Cheyenne. However, the Cheyenne low frequency range provides an excellent airway course to the south, meeting the north course of the Denver low frequency range. Had the Cheyenne meeting frequency audio facility been utilized to a point approximately half way to Denver and had the Denver range then been properly tuned, no difficulty would have been experienced in receiving correct ADF indications and clear aural range signals.

Probable Cause

The probable cause of this accident is that after passing Cheyenne, the flight for reasons undetermined failed to follow the prescribed route to Denver and continued beyond the boundary of the airway on a course which resulted in the aircraft striking mountainous terrain.

Subsequent Action

Following the investigation and public hearing relative to this accident, the Civil Aeronautics Board was informed by the operating company that it had reviewed its entire flight operations administration. This review indicated, among other things, that greater importance would be placed upon indoctrination and training of flight personnel, with particular emphasis on maintenance of route and equipment qualification.

As a result of this accident, the operating company effected a change in DC-6 audio selector panels which contain the six selector switches. This was accomplished by lengthening the middle two toggle switches which select the VAR and other VHF radio navigational receivers, and was done to help avoid any possible mistake by the crew in switch selection.

In the interests of safety and to avoid any possibility of error in identifying the Denver Low Frequency Range and the Denver VAR Range, the CAA placed the code letter "V" before the "DEN" identification signal of the VAR Range.

Accident to DH-104: Toronto, Canada

(Accident No 275)

DURING a ferry flight from Hatfield, England, to Toronto, Canada, a DH.104 crashed at Goose, Newfoundland. Both the pilot and navigator were killed and the aircraft was destroyed.

The Circumstances

The aircraft departed from Bluie West, Greenland, for Goose at 1757 hours with Mingan as alternate, and after various exchanges of radio messages, reported over the Goose Radio Range at 2252 hours.

After refusing G.C.A. assistance, several instrument let downs were attempted using the Radio Range, and the aircraft crashed at 0010 hours.

Investigation

Examination of the aircraft failed to disclose any evidence of failure or malfunctioning of the airframe, engines or controls, while the investigation indicates that at the moment of impact the port engine was producing power but the starboard engine was not.

Three of the four wing tanks were damaged in the crash and were found to be empty. The fourth wing tank was undamaged and contained about one gallon of fuel. The auxiliary wing tank was found to be intact and dry. Examination of the snow in the vicinity of the accident failed to show evidence of fuel having escaped from the damaged fuel tanks.

At the pre-flight weather briefing, the weather for Goose was given as—

"Ceiling 300 feet obscure; visibility 3/8 miles; moderate snow, light blowing snow; wind 25 knots gusting to 40K."

A weather folder was prepared for the flight, but was not picked up by the pilot. Attempts were made by two other pilots to dissuade the pilot from taking the flight and the clearing officer refused to sign a flight clearance for the aircraft.

On arrival over the Goose Radio Range, the aircraft had been in the air for 4 hours 55 minutes. A further one hour eighteen minutes was spent in the vicinity of Goose attempting instrument let-downs, thus giving a total airborne time of 6 hours 13 minutes. On the basis of the fuel consumption for the flight to Bluie West, the

maximum endurance for the aircraft would not exceed 7 hours 30 minutes.

During the hour and 18 minutes that instrument let-downs were being attempted the fuel consumption of the aircraft would have been high.

There is, therefore, a strong possibility that the aircraft ran out of fuel while attempting an instrument let-down.

Conclusions

The aircraft struck the ground at an angle of about 30°. It was not possible to determine conclusively whether or not the accident was precipitated by fuel exhaustion. It is considered that poor judgment was shown by the pilot-in-command in undertaking the flight in such adverse weather conditions.

Inadvertent Undercarriage Retraction: DC-4 Miami, Florida

(Accident No 249)

A DC-4 was damaged when landing at Miami, Florida.

The Circumstances

The flight, which originated at Boston, Mass., was routine until landing.

When approximately 250 feet past the approach end of the runway a normal landing was made on the main landing gear wheels. The aircraft then travelled a considerable distance during which the landing gear was observed to retract, causing the aircraft to settle on its fuselage and slide to a stop. No injuries were sustained and a flash fire in No. 3 engine nacelle was soon extinguished.

Investigation

Although the crew stated that the landing gear control lever was placed in the fully down position, and was not moved again, it is probable that after landing this lever was inadvertently moved upward instead of the flap control lever. This must have occurred when wing lift was still present and there was insufficient weight on the landing gear strut to actuate the landing gear control lever safety switch. This is substantiated by the manner in which the actuating cylinder rods were partially retracted and by the fact that an inspection of the aircraft after the accident showed the flap indicator and flap lever fully down.

It was further established that the landing gear functioned normally prior to and after the accident.

Probable Cause

It was considered that the probable cause of the accident was the inadvertent moving of the landing gear control lever upward during the landing roll, causing the landing gear to retract.

Comment

Inadvertent landing gear retraction has been the subject of some comment in recent Flight Safety Foundation Accident Prevention Bulletins.

The Bulletin of 5th March, 1953, quotes the following incident:—

"*The fourth of this series of landing gear accidents was caused by the pilot, while still reading off the check list, reaching over to retract the flaps and inadvertently retracting the landing gear. The pilot trusted all to "feel" and nothing to "see" when he should have made both a visual and physical check before flipping the switch.*"

In the Bulletin of 23rd March, 1953, a leading airline engineer made the following reply to the above incident:—

"*I judge from the wording of the item that you are inclined to blame the pilot for flipping the wrong toggle switch as between flap and landing gear, I would say that any lack of positive identification by feel, or sight, or location, between two such important and different operating devices is an error in design and can in no way be attributed to pilot error.*"

PART III

AUSTRALIAN ACCIDENTS

(1730/52)

Taxying Accident - DH.82

After landing from a local solo flight, a DH.82, on receiving green flashes from the control tower, turned right because of another aircraft close to the port side. When cross wind a gust of wind lifted the port wing and the aircraft overturned.

The primary cause of the accident was the adverse wind conditions which existed at the time of landing. A contributory cause was poor technique by the pilot in attempting to turn the aircraft cross wind under such conditions.

It is pointed out that a flashing green light from the tower signifies a clearance to taxi only, and it is not a specific clearance to taxi cross wind.

(1731/52)

Propellers Damaged by Stones - Canobie, Q'ld.

While a DH.84 was taxying to the take-off point at Canobie, Queensland, the aircraft propellers were split by small stones which were presumably drawn up from the tyres. The sticky surface had caused the stones to adhere to the tyres.

Landing areas in the Channel Country present a problem because of small stones and it is possible that similar damage, although to a lesser degree, could occur which may not be apparent until the aircraft becomes airborne.

Pilots are therefore requested to exercise special care to minimize the risk of damage to propellers when operating in the area.

(1803/52)

Training Accident - DH.82

A DH.82 aircraft spun and crashed during a training flight which involved forced landing practice in an approved training area. The pilot suffered serious injuries while the aircraft sustained major damage.

It was considered that the primary cause of this accident was poor technique on the part of the pilot in that he failed to effect an immediate recovery from an incipient spin which resulted from a poorly executed side-slip.

A contributory cause of the accident was the pilot's limited flying experience.

(1875/52)

Propeller Lost in Flight

At about 1330 hours on 23rd November, 1952, an Auster lost its propeller in flight and was extensively damaged during the subsequent forced landing in a field on the outskirts of Katoomba, N.S.W. Both occupants of the aircraft received minor injuries.

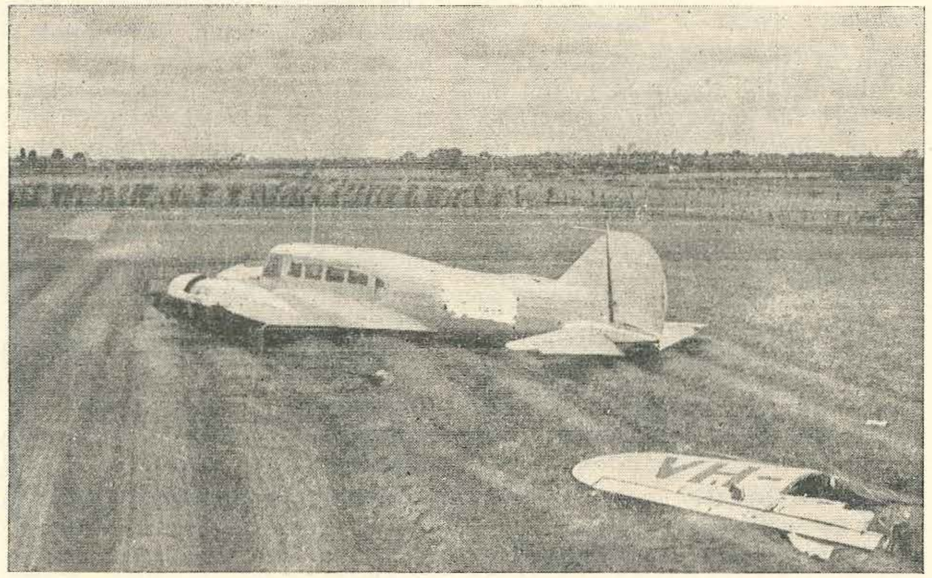
The loss of the propeller, which had been in service for 110 hours, was due to lack of maintenance in that the propeller hub bolt nuts had not been checked for tightness at the 25, 50 and 100 hours periods, as required by Air Navigation Order 107.1.0.2.2.

The aircraft was not being operated under a current Certificate of Safety, as required by Air Navigation Regulation 38. The last Certificate of Safety issued for the aircraft expired some 2½ months prior to the accident. In addition, the engine and airframe log books of the aircraft were not maintained in accordance with Air Navigation Regulation 71.

(30/53)

Take-Off Accident, Moorabbin Airport

Immediately after becoming airborne from Moorabbin Airport, Victoria, on 17th January, 1953, the port engine of an Avro Anson failed. The aircraft continued across the aerodrome a few feet above the ground until it struck a telephone post on the road at the northern boundary of the aerodrome and crashed into a field on the opposite side of the road. The crew of three were uninjured. The aircraft was extensively damaged by collision and impact.



History Of The Flight

On the evening of the day prior to this flight the aircraft was inspected by a licensed aircraft maintenance engineer and found to be airworthy. After the aircraft was loaded and immediately prior to flight the pilot carried out a pre-flight inspection and just before leaving the tarmac the engines were given a full run-up. An engine revolution drop of approximately 150 revolutions on the starboard magneto of the starboard engine revealed during this run-up was cleared after the engine had been operated for some 15 to 20 minutes.

The aircraft was then taxied to the take-off point where the pilot carried out a pre-take-off cockpit check. The commencement of the take-off was quite normal and after travelling approximately 1800 to 2000 feet the aircraft became airborne. At this stage, the pilot felt a loss of power which he at first thought was in the starboard engine because of the previous r.p.m. drop. However, he immediately realized, from the tendency of the aircraft to swing to the left, that the power loss was on the port side and was moving to pull the port throttle off when the engine momentarily picked up again. The pilot thought that it was only a temporary loss of power and decided to continue to take-off, but almost immediately the port engine failed completely. Realising that he would not be able to climb away, the pilot elected to fly under some telephone wires on the northern boundary and land in a paddock across the road rather than attempt to bring the aircraft to rest within the aerodrome boundary.

The aircraft gradually lost height and the main wheels struck a mound of earth near the aerodrome boundary. It then bounced across the road and struck a telephone post, severing some 14 feet of the port wing, and finally struck the ground on the other side of the road, coming to rest in a cultivated field.

Analysis

An examination of the engines failed to reveal any defect, abnormality or evidence of malfunctioning that may have contributed to or caused the engine failure.

The testimony of the pilot and crew revealed that there had been an unnecessary, unorthodox and complicated manipulation of the fuel cocks prior to take-off which suggested that the engine failure could have been due to mismanagement of the fuel system.

The nature of the engine failure was consistent with fuel starvation. Furthermore, the stage at which the engine failed corresponds with the point an engine would fail if the fuel had been turned off at the pre-take-off position.

Interrogation of the pilot revealed that this was only his second flight as a pilot of an Anson aircraft for some nine years and that he was not entirely familiar with the fuel system.

There is no possibility that the take-off could have been continued after the loss of one engine as tests show that an Avro Anson, with the undercarriage down, will only just maintain height on one engine, at an all-up weight of 7,400 lb., when operated under standard atmospheric conditions at sea level. The aircraft in this case was loaded to approximately 8,200 lb.

Cause

The cause of the accident was the failure of the port engine, just after the aircraft became airborne, which resulted in the aircraft being unable to climb away. The engine failure was caused by fuel starvation probably due to mismanagement of the fuel system by the pilot.

(16/53)

Take-Off Accident - Hookers Creek, N.T.

During the take-off run at Hookers Creek, Northern Territory, the pilot of a DH.89 decided to abandon the take-off owing to a violent change of wind. The aircraft overran the end of the strip and ran into partially cleared scrub. The aircraft was extensively damaged, but neither the pilot nor the two passengers was injured.

At Hookers Creek there is a single strip 3,200 feet long on bearings 098° and 278°. It is level for the western two-thirds but the eastern end rises in a gradual gradient to the east.

The pilot landed at Hookers Creek without incident although he noticed that a deterioration in the weather was imminent. Two passengers and some mail were taken aboard and preparations were made to take off in the 098° direction of the landing strip.

When half the take-off run had been completed and before the aircraft was airborne a violent swing of wind to 300° occurred. This resulted in a tail wind component estimated at 50 m.p.h. The pilot, sensing that he was covering too much ground before obtaining flying speed, decided to abandon the take-off when two-thirds of the runway had been covered without becoming airborne. Despite the remaining uphill slope and the application of brake, the aircraft, helped by a strong tail wind, continued beyond the end of the runway into the partially cleared extension where it collided with scrub before being brought to a halt.

Conditions of violent wind changes are well known in this locality, but as local meteorological information is dependent largely on voluntary reports from stations, wind changes cannot be easily forecast. Although the pilot suspected that a change might occur, he underestimated its imminence and intensity. A more careful judgment of weather conditions may have shown that adverse wind conditions could be expected at or about the time of take-off.

The cause of the accident was a sudden and violent change in wind velocity which the pilot did not anticipate.

PART IV

INCIDENT REPORTS

(693/52)

Tie Down Facilities - Q'ld.

An airline captain suggested that tie-down facilities be provided for DC-3 aircraft at Charleville because of the possibility of high wind conditions, particularly during the monsoon season.

As a result of this suggestion, and also because of representations from airline companies, tie-down facilities will be provided as soon as possible at Charleville, Cairns and Longreach.

(875/52)

Radio Compass Sense Aerials

During recent months there has been a large number of broken sense aerials on all types of aircraft. A.W.A. Pty. Ltd. are currently investigating the construction and installation of the sense aerials in an endeavour to ascertain the cause of the failures with a view to introducing a suitable modification.

(1213/52)

Fuel Tank Fire

While maintenance was being carried out at Charleville on a Drover which was parked on the refuelling apron, the port fuel tank caught fire at the fuel gauge housing. The fire was quickly extinguished.

Just prior to this incident a short circuit in the starboard fuel gauge circuit, caused by the aircraft master switch being left on during maintenance, resulted in the burning of the wiring between the fuel quantity transmitter and the junction box.

The wiring was replaced and a check was then made on the port fuel gauge mechanism. However, while taxying from the hangar, it was noticed that the port fuel gauge needle was hard over.

Before checking the circuit the engineer called to the pilot to place the aircraft master switch in the "OFF" position. The port float mechanism was then removed and found to be satisfactory, but while it was being replaced a short circuit occurred which caused the fuel which had escaped from the tank to catch fire. A check on the electrical circuit failed to reveal any cause of the short circuit.

After a comprehensive investigation it was concluded that the short circuit was caused by the aircraft master switch not being in the "OFF" position during the maintenance on the port float mechanism.

The master switch fitted to this aircraft is a rotary type which gives no clear visual indication of the state of the circuit. Since this incident, this Department has published A.N.O. 105.1.0.1.45 which makes it mandatory for all aircraft to have a positive indication of the position of the battery master switch. The date of compliance with this Order has been set at 1st September, 1953.

As an added precaution the operating company has issued instructions that the aircraft battery must be either disconnected or removed whenever work of the nature reported here is being carried out.

(1523/52)

Private Pilot v/s Flight Plan

The pilot of a DH.82 did not adhere to his flight plan while enroute from Yaringa South to Byro Station in Western Australia, thus causing emergency procedure to be introduced.

The pilot has been informed of the inconvenience and expense he caused to the Department and it has been pointed out to him that if he requires the ready availability of S.A.R. he must adhere rigidly to his pre-arranged itinerary and make every effort to ensure that his arrival messages reach the appropriate authority without undue delay.

This incident is just another case of private pilots not following the procedures laid down by this Department for private flights. It must be pointed out that these procedures are not intended to be restrictive in any way, but are designed to give utmost assistance to private pilots, especially in cases of emergency.

(1541/52)

Vampire Flights

On 12th September, 1952, two DC-4s enroute from Melbourne to Sydney, flying at 10,000 feet and 8,000 feet respectively, were diverted from the air-route in the vicinity of Benalla because of insufficient separation from a Vampire aircraft which was descending on the air-route from 20,000 feet preparatory to landing at Laverton.

Because of fuel limitations special procedures have been designed to handle Vampire flights between Richmond, Williamtown, Woomera and Laverton. These procedures were promulgated in July, 1952.

For Vampire aircraft descending into Laverton, the procedures state that departures from Essendon shall not be permitted before the arrival of the Vampire unless the departing aircraft are estimated to pass the Vampire's descent point at least 10 minutes before the Vampire is estimated to reach that point.

In this particular incident, the departure signal stated that the Vampire wished to commence descending at Benalia and that the E.T.A. at the point was 0013Z. As the Benalla E.T.A.'s of the DC-4's were 0006Z and 0013Z, respectively, it is apparent that the DC-4s were permitted to depart in contravention of the prescribed procedures.

Suitable action has been taken to ensure that the specified procedures will be applied in future.

(1583/52)

Eternal Vigilance

A non-radio equipped DH.84 made a straight-in approach on to Runway 159° at Leigh Creek, South Australia, just as a DC-3 taxied on to the runway for take-off. The DH.84 was enroute from Maree to Broken Hill and had diverted to Leigh Creek because of adverse winds.

The pilot of the DH.84 was informed that he should have completed a circuit of the aerodrome prior to landing so that he would be able to observe any activity on the aerodrome. Also, a circuit would have given others a chance to become aware of his presence.

The failure of the pilot of the DH.84 to complete a circuit of the aerodrome prior to landing is considered to be a poor display of airmanship. In addition, it is considered that the pilot of the DC-3 was not completely blameless as he apparently failed to ensure that the approaches were clear before entering the runway.

(1624/52)

Fog Bound

A DH.104 was unable to land at Esperance, due to fog and low cloud.

Following on this incident the Officer-in-Charge at Esperance has undertaken to pass a warning to the A.T.C. Centre at Guildford whenever the weather conditions at Esperance Aerodrome may constitute a landing hazard. This information will then be considered in consultation with the Meteorological Officer and appropriate action taken with regard to the continuance or otherwise of the flight.

(1748/52)

Aeroantics

A DH.82 flown by an instructor carried out violent manoeuvres in the circuit area at Maylands, thereby endangering other aircraft in the vicinity.

This was the second breach by the pilot within a short time and he has been reprimanded for his conduct. In addition, a recent application from the pilot for upgrading as an instructor has been deferred pending his demonstration of ability to accept the responsibilities and privileges specified in A.N.O. Part 40.

(1764/52)

Significant Weather Information

While on a night approach a DC-3 was forced to go round after encountering a sudden severe squall. The warning from the Control Tower was received after the squall struck.

Under visual conditions, the aircraft captain has as good a view of the weather as the Airport Controller and is able to anticipate wind changes. At night, the Airport Controller has to wait until the wind change is indicated on the anemometer before warning the pilot accordingly. Consequently, the warning to an aircraft on approach will be almost coincident with the change, and can easily be received by the aircraft after the wind change has been experienced.

As a result of this incident, and also of a previous case where the pilot suggested that more complete weather information be provided by Airport Control, Airways Operations Instructions, Volume 2, Section 4.2, has been amended to cover significant weather.

The amendment is as follows:—

"*1.7 — Significant Weather Information.*

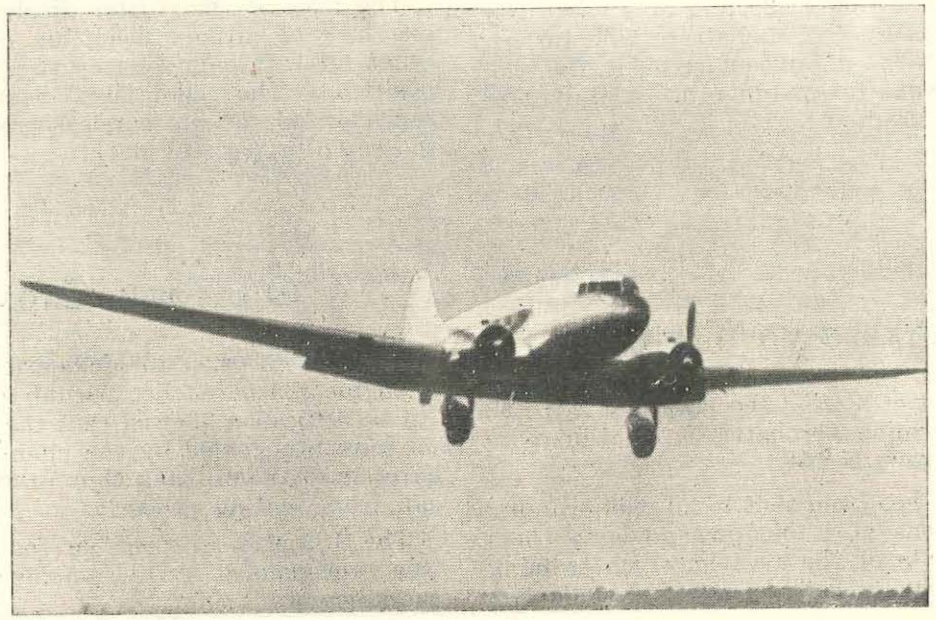
1.7.1—Significant weather is any weather phenomena which might affect flight visibility or present a hazard to an aircraft.

1.7.2—Airport Control shall issue significant weather information to all aircraft under control and state its disposition and intensity, e.g.,"Light rain south of the field".

(1834/52)

Tank Feed Back

The port engine of a DC-3 failed while the aircraft was on the final stages of an approach to Essendon. The engine failure was caused by the left main tank running dry.



The left main tank had been drained by feedback from the left main to the left auxiliary tank, the estimated rate of feedback being 20 gallons per hour.

The feedback was not detected due to a faulty fuel gauge which gave flickering and unreliable readings on the left main tank and indicated 10-15 gallons in the left auxiliary tank which in fact contained about 80 gallons.

The fault was corrected by changing the auxiliary tank selector and re-rigging all selectors.

(1866/52)

Low Flying

A resident of Windsor, a suburb of Brisbane, phoned Archerfield to report that a DH.82 was flying very low over houses in the vicinity, causing serious alarm to the residents.

After investigation it was considered that the pilot flew the aircraft in contravention of Air Navigation Regulation 133(2) (a) and summary proceedings were instituted against him.

On his subsequent appearance in Court, the pilot was fined £25 and ordered to pay £2/8/ costs by the Magistrate who further ordered that in default of payment, the pilot be imprisoned for one month. A stay of 28 days was granted.

(1883/52)

Bankstown Training

The pilot of a DC-4 reported that a DH.82 was performing aerobatics on the air-route near Lithgow, N.S.W.

A letter has been sent to all pilot training organizations at Bankstown advising them of the limits of the area in which training flights from Bankstown must be conducted.

(2034/52)

Escape Hatches

The pilot's escape hatch on a DC-3 came adrift shortly after take-off. The escape hatch had apparently been unlatched between the time of servicing of the aircraft and take-off, but subsequent investigation failed to reveal the person responsible.

Aircraft Captains are reminded that under AN.R.235(1)(6) and A.N.O. Part 20 Section 20.2, it is the responsibility of the pilot-in-command to ensure that all emergency hatches are secure before take-off.

(77/53)

Airport Discipline

An Auster taxied past the Control Tower at Bankstown within 20 feet of the signal square. The wind "T" was pointing NE, but the aircraft took off into the SW without the pilot giving any notice of his intentions. During the take-off, the aircraft crossed the landing path of several aircraft, causing some of them to go around again, and shortly after becoming airborne made a climbing right-hand turn from 100 feet on to course.

The pilot of the Auster displayed a serious lack of airport discipline resulting in other aircraft being placed in a hazardous position. The pilot has been severely reprimanded for his carelessness in failing to keep a proper look out.

(85/53)

Oil Tank Caps

A DC-4 returned to Melbourne with No. 4 engine feathered because of an oil leak. An investigation showed that the cap of the oil tank was fouled by the chain which secures it to the oil tank thus preventing the cap from seating properly.

The L.A.M.E. responsible for the error was reprimanded by his employers for his carelessness.

(106/53)

Engine Failure in Flight

The Captain of a DC-4 enroute from Sydney to Melbourne advised Melbourne Area Control that he would be landing on three engines, No. 1 engine being feathered because of low oil pressure.

This was the first positive indication that either Sydney or Melbourne Air Traffic Control Centre had of the engine failure, although the pilot had advised Canberra that his T.A.S. had been reduced to 155 knots.

The procedures to be adopted in the event of an engine failure in multi-engine aircraft in flight have recently been promulgated in A.N.O. Part 20.6.

(296/53)

Shifting Loads

The Captain of a DC-3 was forced to abandon the take-off run because the load, which consisted of steel girders, had shifted.

Aircraft captains are reminded that it is their responsibility under A.N.R. 225 to ensure the aircraft load is properly secured prior to take-off.

(445/53)

DC-4 Auto Pilots

Enroute from Sydney to Brisbane, the captain of a DC-4 attempted to disengage the automatic pilot to handfly the aircraft through cumulus cloud. However, the elevator section of the automatic pilot did not disengage.

The captain immediately informed Coff's Harbour Aeradio of the trouble and, on request, advised that no difficulty was expected in landing, but he would call later if any was anticipated. About 30 minutes before E.T.A., Eagle Farm was advised that the pilot expected some difficulty in landing, and requested the usual precautions to be taken. However, the landing was completed without incident.

On investigation, it was found that the automatic pilot servo-control handle had become detached from the elevator autopilot servo valve control assembly due to the recessed round head screw completely unscrewing from the control assembly.

As a result of this incident immediate action was taken to rectify the defect and provide for regular inspection of the automatic pilot servo valve ON-OFF control handle.

During the course of the investigation of this incident, it was necessary to specifically request a report on the occurrence from the captain of the aircraft. In reply, it was stated that an Air Traffic Controller at Eagle Farm had told the captain after landing that it was not necessary to submit an incident report.

This aspect of the incident is most disturbing as, under the requirements of A.N.R. 274, it is the responsibility of the pilot-in-command to ensure that any incident which occurs to an Australian aircraft is notified to this Department.

The pilot-in-command should not be influenced by any other person in making up his mind whether or not an incident report should be submitted.

In addition, the Air Traffic Controller who advised the pilot that an incident report was not necessary exceeded his duty in offering advice which was contrary to the requirements of the Regulations.