

No. 17

ITAVIA Airline Company, Douglas DC-3, I-TAVI, crashed into mountainous terrain south of Rome, Italy on 30 March 1963. Report released by the Directorate of Civil Aviation, Italy (undated)

1. Investigation1.1 History of the flight

Flight IT 703 was a scheduled domestic flight from Pescara Airport to Rome/Ciampino. The aircraft which had departed Rome at 1526 hours GMT, took off from Pescara with the same crew at 1736 hours on an IFR plan and climbed to flight level 100, its cruising altitude. At 1739 hours the pilot requested radar guidance from the Pescara defence radar "FIONDA", which is not normally available for flight information service to civil aircraft. The first part of the flight was intentionally carried out south of the direct route to avoid heavy cloud formations.

At 1750 hours the Pescara defence radar picked up the flight in the Ortona area and at approximately 1803 hours it passed to the flight "QDM Ciampino 265°, distance 80 NM". At 1805 hours the pilot reported this position to the Rome ACC/FIC. After having directed the flight around some cumulo-nimbus the Pescara defence radar lost the aircraft at 1812 hours.

At 1816 hours the pilot enquired whether the aircraft had been picked up by the Rome surveillance radar. Two minutes later he reported to Rome ACC/FIC that he was crossing the eastern edge of airway A 14 and requested a clearance to Rome NDB "LJ".

At 1822 hours he reported having Rome in sight and requested authorization to descend from flight level 100. Two minutes later, upon confirmation that Rome was in sight, the flight was cleared to proceed to Rome NDB and to descend to 6 000 ft. At 1828 hours the pilot reconfirmed that he had Rome in sight and requested clearance to descend further. The flight was then given instruction to contact Ciampino tower, but was unable to establish communication either on the tower frequency or on 120.1 or 124.1 Mc/s and therefore came back on the Rome ACC/FIC frequency. At 1830 hours the pilot reported that he was unable to tune on Rome NDB and had to keep out of the clouds since his radio compass was not working properly. At that time the Rome 2 defence radar which had first picked up the flight around 1802 hours, lost its trace in the Arpino area. Around 1832 hours, on a request from Rome ACC/FIC, the pilot reported that he was in the vicinity of Mount Cavo, of which he could see the antennae. One minute later the flight lost visual contact with the ground and, since the pilot believed that his radio compass was out of order, he requested clearance to proceed on Ostia VOR. At 1835 hours he was cleared to Ostia VOR at 6 000 ft, but reported that his VOR was not giving reliable information and that he would fly on a heading of 270° and break over the sea. This was the last message of the aircraft.

The aircraft was subsequently found on a very steep slope on the southeast side of Mount Serra Alta at an elevation of 1 630 m.

The accident occurred around 1837 hours.

### 1.2 Injury to persons

Injuries	Crew	Passengers	Others
Fatal	3	5	
Non fatal			
None			

### 1.3 Damage to aircraft

The aircraft was completely destroyed.

### 1.4 Other damage

None reported.

### 1.5 Crew information

The crew consisted of a pilot-in-command, a co-pilot and a trainee steward.

The pilot-in-command held a valid airline transport pilot licence with numerous type rating including one for DC-3 and instruments and night flying qualifications. His last medical examination took place on 4 January 1963. He had a total of 10 731 flying hours, 2 296 of these being on DC-3 aircraft. He had flown a total of 85 hours during the 30 days prior to the accident and of 17 hours during the 7 days prior to the accident.

The co-pilot held a valid airline transport pilot licence with a rating for DC-3, and his last medical examination took place on 5 February 1963. His total flying time was 832 hours, including 134 hours during the last three months, all of them on DC-3 aircraft.

### 1.6 Aircraft information

The aircraft had a certificate of airworthiness valid until 2 August 1963. It had flown a total of 13 941 hours, including 244 hours since its last overhaul. The engine total times were 8 734 and 4 414 hours, including 244 and 942 hours respectively since their last overhaul.

The aircraft was equipped with an ADF receiver and indicator, a VHF/VOR-ILS receiver and indicator, and a VOR radial selector (OBS). Within 10 days prior to the accident the OBS and the ADF receiver were replaced and the ADF timing scale had been aligned.

At the time of the accident, the computed weight and centre of gravity position were within specified limits.

The type of fuel used was not indicated in the report.

### 1.7 Meteorological information

The weather situation over Italy at 1800 hours Z on 30 March 1963 was:

a) At ground level:

A large depression extended from Southern England to Central Europe and Italy with two main lows over the Gulf of Genova and the Venetian region. Masses of cold air moving in from the Rhone Valley and the Gulf of Lyons had invaded the Italian peninsula. The main cold front which constituted the front edge of this cold air invasion extended at 1800 hours GMT from Venice along the Adriatic to Lecce and was moving from the west toward the east. The frontal cold mass was very unstable with extensive masses of heavy cumulus and cumulo-nimbus accompanied by rain storms and snowfall on high ground above 5 000 ft. At 1800 hours GMT a secondary cold front was taking shape from the upper Tyrrhenian to the Eastern Coast of Sardinia and Tunisia, which was also moving in an easterly direction.

b) Situation at 5 000 and 10 000 ft levels:

Vast regular depression with low point over Lombardy. Currents from NW over Gulf of Lyons, Genova, Corsica, 30 - 40 kts.  
Westerly winds 30 - 40 kts over Sardinia, the middle and lower Tyrrhenian.  
SW currents 30 - 40 kts over middle and lower Adriatic.

The weather forecast for the Rome - Pescara route as supplied to the pilot-in-command before take-off from Rome was:

- Sky very cloudy, locally overcast:

Low clouds: 3/8 to 5/8 stratocumulus: base 1 500 - 2 000 ft,  
top 5 000 - 7 000 ft; 2/8 to 4/8 cumulus: base  
1 500 - 2 000 ft, top 12 000 - 14 000 ft

Middle clouds: 3/8 to 5/8 altocumulus and altostratus: base  
10 000 ft, top 14 000 - 16 000 ft; isolated  
cumulonimbus, top 21 000 ft

- Moderate turbulence and icing conditions along entire route; strong turbulence and heavy icing conditions in heap clouds

- Freezing level: 5 000 ft

- Surface visibility: 10 km

- Upper winds: 5 000 ft 220°/25 kt  
10 000 ft 240°/40 kt

Weather conditions at the time and site of accident were:

Cloud cover: 6/8 stratocumulus and cumulus: base about 3 000 ft, top estimated at 8 000 - 9 000 ft

Light steady rain in area towards west with possibility of local thunderstorms

Surface wind 200°/10 - 15 kt  
 Wind at 3 000 ft: 260°/25 kt  
 Wind at 6 000 ft: 260°/35 - 40 kt  
 Wind at 10 000 ft: 260°/40 kt

Temperature and dew point:

3 000 ft	4°C	1°C
6 000 ft	-3°C	-6°C
10 000 ft	-9°C	-16°C

Surface visibility: 10 km

Upper air visibility, outside of cloud: good

Risk of turbulence due to terrain features and thunderstorms in the area

General risk of light icing conditions within cloud from 5 000 ft to 10 000 ft

No information regarding the weather was requested at Pescara, however, the pilot-in-command was aware of the weather conditions along the route because he had flown the route Rome - Pescara a few hours before and had exchanged information with the pilot of another flight en-route from Pescara to Foggia.

#### 1.8 Aids to navigation

The radio aids to navigation along the Pescara - Rome route included four VOR's (Ostia, Bolsena, Teano and Ancona), seven NDB's (Bolsena, Teano, Frosinone, Rome, Bracciano, Ciampino and Guidonia), Rome surveillance radar, Rome defence radar, Brindisi defence radar, and VDF's at Mounts Silvano and Guarcino. Ciampino Airport instrument approach aids are ILS, GCA, VDF/APP and an NDB at Pratica di Mare for missed approaches. From the time of departure to the time of accident, no report of unsatisfactory performance was received for those aids.

#### 1.9 Communications

The radio communications between the aircraft and the ground stations were satisfactory except that contacts with FIC Rome were made on the military control frequency 122,1 Mc/s instead of on frequencies 120,1 and 124,1 specified for traffic entering the Rome Terminal Area, because of communication difficulties on the appropriate frequencies as reported by the pilot.

#### 1.10 Aerodrome and ground facilities

Not pertinent to the accident.

### 1.11 Flight recorders

Not mentioned in the report.

### 1.12 Wreckage

The accident site was located at 70 m from the mountain crest, which at this point reached an altitude of 1670 m. The wreckage was lying on the snow in a limited area with the axis of the fuselage oriented 282° and the nose of the aircraft pointing towards the mountain crest (See Figure 17).

The forward and central part of the fuselage was destroyed together with the left wing. The aft part of the fuselage and the tail assembly appeared to be intact.

### 1.13 Fire

The left fuel tank was smashed on impact and the escaping fuel caught fire. The fire completely destroyed the central part of the fuselage.

### 1.14 Survival aspects

Due to adverse weather conditions and terrain difficulties the accident site was reached three days after the accident.

### 1.15 Tests and research

Tests were made of the altimeter, the elapsed time clock, and the VOR Omni-Bearing Selector in the aircraft. The altimeter was set at 1 013.2 mb, the clock indicated 1 hour 4 minutes and the magnetic heading was between 269° and 270°.

## 2. Analysis and conclusions

### 2.1 Analysis

Evidence at the accident site indicated that the aircraft was flying at a heading of approximately 300° in a nearly straight and level altitude and that it was converging with the slope of the mountain at an angle of approximately 60°. The left wing and propeller struck first some trees; the propeller became detached, the wing was bent backward and its tip together with the aileron broke off and was found 15 m to the left of the main wreckage. This swung the aircraft anticlockwise, the fuselage struck some trees, came into contact with the ground and was deflected upward by the slope to finally come to a halt on a large stump. The right side burst open and the bodies of the passengers were thrown outside.

At the same time the right wing was stopped by a large tree.

No evidence of damage or failure of the aircraft or its engine prior to impact were found.

The autopsy did not reveal any evidence of incapacitation of the crew.

Negligence in the preparation of the flight was found: no weather information was requested at Pescara before departure and the flight plan did not take into

account the winds and the minimum safety altitudes requested for obstacle clearance along the planned route. However, the pilot-in-command was aware of the weather along the route because he had flown the route Rome - Pescara a few hours before and also had exchanged weather information with the pilot of another flight.

The Board considered that the following psychological factors might have played a role in the decision of the pilot to carry out this flight in spite of the very bad weather conditions and the late hour:

- overconfidence in his abilities supported by the fact that he was very familiar with this route
- the fact that he was chief pilot-instructor of the airline
- the fact that the Vice-President of the airline was a passenger.

After take-off, the pilot intentionally departed from the flight plan and flew south of the approved direct route Pescara - Rome (See Figure 18). He, however, failed to report this change to the appropriate ATC units. During the first part of the flight, he received radar assistance from Pescara defence radar and was therefore able to circumnavigate cumulo-nimbus which were numerous at the time. At 1803 Pescara radar gave him a fix, and he reported accordingly to Rome ACC/FIC. This was the only accurate position report, all subsequent position reports and estimated time of arrival to reporting points were either incomplete or erroneous. The fact that the pilot enquired at 1816 hours if Rome had radar contact with him and reported at 1818 hours that he was crossing airway A 14 indicated that he believed being far more to the north-west than he really was. Furthermore, if he had been aware of his exact position he would never have requested, four minutes later, clearance to descend, as there were several peaks above 6 600 ft in the area.

An examination of the flight positions recorded by Rome 2 defence radar led to the conclusion that when the pilot reported seeing the lights of Rome and shortly after the Mount Cavo antennae, he actually was in the Arpino-Frosinone-Sora area and probably mistook the lights of Sora, or Frosinone, for those of Rome and the Mount Favone antennae for those of Mount Cavo. This erroneous estimate of his position made him believe that his radio compass was out of order, when he was unable to tune on Rome NDB "LJ". In fact, he was probably out of range to receive the radio beacon signals, especially with the presence of cumulo-nimbus in the area. The Rome surveillance radar was not able to pick up the aircraft that far away because of the weather conditions and the terrain. The unreliable indication given by the Ostia VOR, as reported by the pilot, might be explained by the fact that the aircraft was flying at low altitude over mountainous terrain. Furthermore, as the pilot reported that his instruments were only partly efficient due to flight conditions, it was concluded that after having lost the assistance of Pescara radar he ran into clouds and heavy turbulence and had difficulties in maintaining the aircraft altitude and route. No reasons were found to explain why the crew failed to request the assistance of the VDF stations available at Mounts Silvano and Guarcino and of Rome 2 defence radar. Whether the crew deliberately neglected such assistance or were unable to do so could not be determined. Fatigue was also considered as a possible contributing factor in this accident.

## 2.2 Conclusions

### Findings

Both pilots were properly certificated and qualified for the route. The pilot-in-command had a large experience of the route.

The aircraft had a valid certificate of airworthiness and at the time of the accident its gross weight and centre of gravity were within the specified limits.

The weather along the route was particularly bad with strong head winds and numerous cumulo-nimbus clouds. No weather information was requested at Pescara, however, the pilot-in-command was well aware of the situation as he had flown the route Rome-Pescara a few hours before and had discussed the weather with the pilot of another flight.

No evidence of damage or failure of the aircraft or its engines prior to impact were found.

After take-off the flight intentionally departed from the flight plan and flew south of the approved direct route Pescara-Rome without reporting so to ATC.

During the first portion of the route, the flight, which was receiving assistance from Pescara defence radar, was able to circumnavigate heavy cumulo-nimbus and was given a fix at 1803 hours QDM Ciampino 265°, distance 80 NM. This was the only accurate position report passed by the flight to Rome ACC/FIC.

When Pescara defence radar lost the aircraft at 1812 hours the aircraft probably ran into clouds and heavy turbulence and the pilot had difficulties in flying the aircraft and navigating. Estimating his position far more north-west than he actually was, he started to descend in a region of high peaks and crashed on the south-east side of Mount Serra Alta at an altitude of 1 630 m.

Assistance of two VDFs and of Rome 2 defence radar available along the route were not requested.

### Cause or

### Probable cause(s)

1. Significant errors by the pilot in estimating his own position with consequent presumed identification of lights in the Rome area and of the Mount Cavo antennae, which led him to:
  - a) misjudge the effectiveness of the aircraft radio and navigational equipment;
  - b) request clearance to descend to 6 000 ft and subsequently below the specified level in order to maintain at all costs visual contact with the ground, with the result that he crashed into the mountain because of inability to achieve the desired visual contact.

2. Particularly adverse weather conditions over the last segment of the route flown at night.
3. Failure to report to the various ATC units the departures from the flight route indicated in the PLN submitted prior to departure and in the subsequent PLN transmitted by the pilot after departure.
4. Added to the above, the unfortunate concurrence of a series of facts and circumstances that all played against the pilot.

### 3. Recommendations

1. As regards the ITAVIA Airline Company:
  - a) pending completion of the replacement programme of DC-3's with other aircraft, DC-3's and aircraft of similar type should be used on the Rome - Pescara route with some caution in view of the terrain features along this route and the violent thunderstorms frequently encountered;
  - b) every effort should be made to modernize and improve the efficiency of their flight operations organization, flight planning, study of routes and efficiency of station operations at various stopping points;
  - c) the attention of their pilots should be drawn to the need for:
    - i) early reporting of any change in the current flight plan to the ATC units concerned,
    - ii) utilization of all available aids, regardless of weather conditions.
2. While recognizing that radar information service (recently established on a trial basis and proved to be very useful) is strictly limited to providing information to pilots who request assistance, and therefore is quite separate from ATC services, nevertheless it would be highly desirable to expedite studies to achieve optimum co-ordination between the radar units selected to provide this information service and the ATC units, and to establish the necessary procedures for rapid communications between these services.

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ACCIDENT TO DC-3, I-TAVI, OF ITAVIA AIRLINE COMPANY, SOUTH OF ROME, ITALY.  
30 MARCH 1963

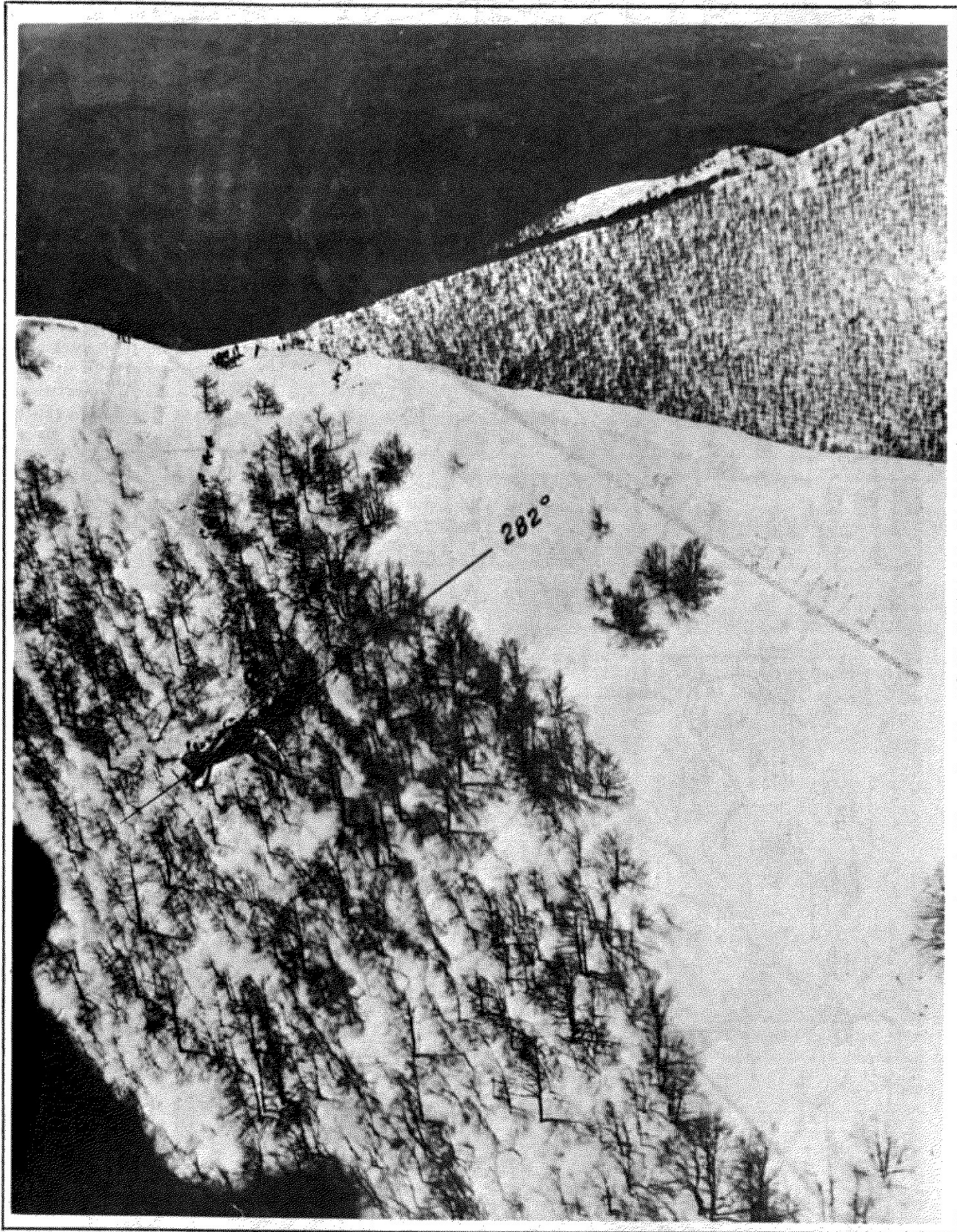


FIGURE 17

ACCIDENT TO DC-3, I-TAVI, OF ITAVIA AIRLINE COMPANY, SOUTH OF ROME, ITALY. 30 MARCH 1963

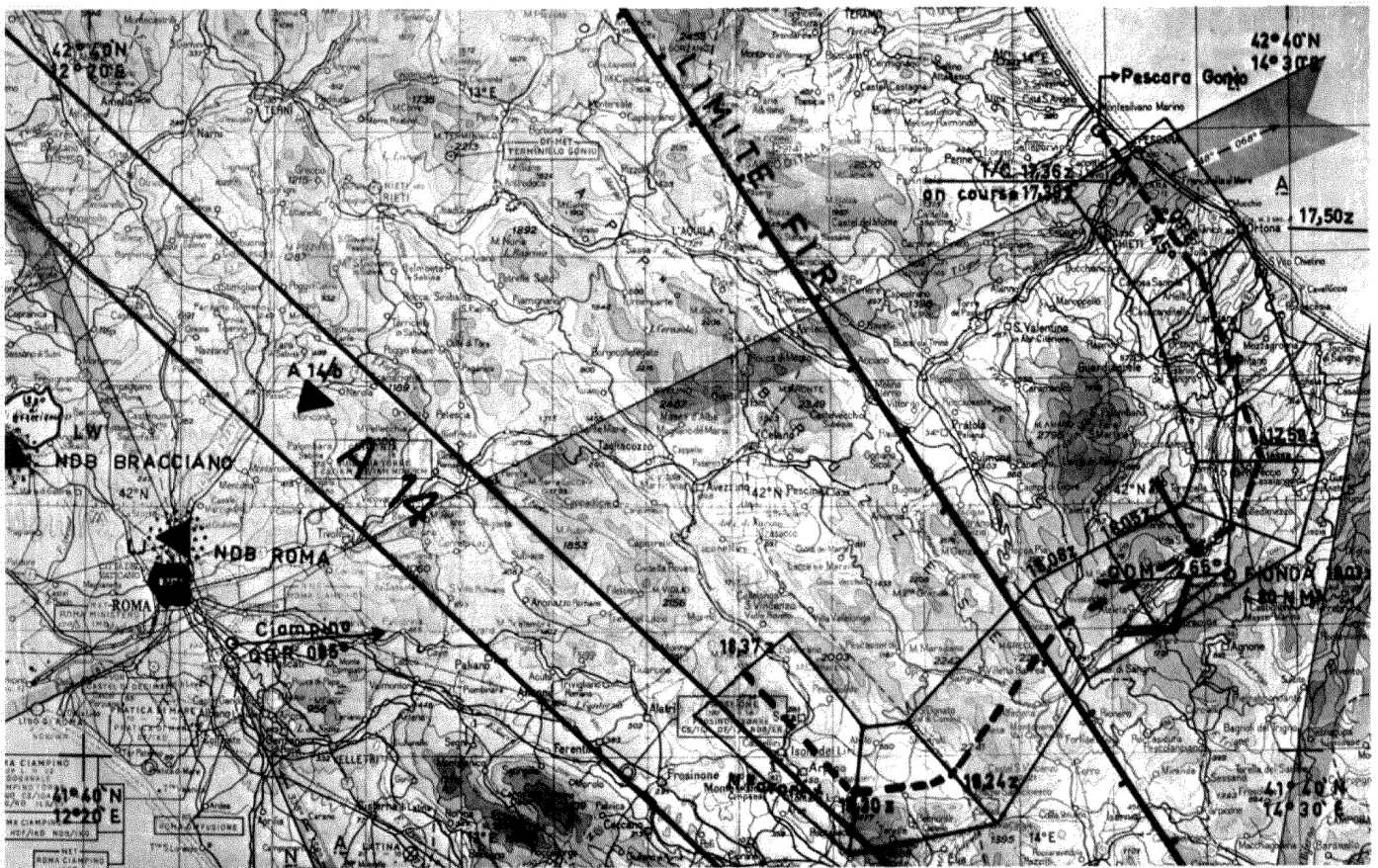


FIGURE 18